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Budget Effects on Transport

ALTHOUGH to the general public the changes made by the Chancellor of the Exchequer in his Budget last Tuesday may seem relatively unimportant, the effect of some of them on transport will be considerable. On the credit side, a very large number of transport workers will be among those who secure the major benefits from the reduction in the lower income-tax rates, but it is very far from likely that the concession which has been made will have any salutary effect on the pending claims for higher wages. The railways and road haulage and passenger operators will have their costs increased substantially by the addition of 9d. a gallon in the duty on petrol and other light and heavy oils used as road fuel. The railways are estimated to use about 1,110,000 gal. of diesel oil a year, together with some 8,100,000 gal. of fuel oil. In the case of London Transport, the annual cost of the tax changes on petrol and oil has been put at an extra £1,250,000. The British Transport Commission, through the Railway Executive, London Transport Executive, the Road Haulage Executive and the Road Passenger Executive in particular, may well find itself saddled with an additional fuel oil bill of well over £3,000,000 a year. Its other Executives, those dealing with hotels and with docks and inland waterways, are also oil users on a considerable scale. Moreover, the imposition of a 33⅓ per cent. purchase tax on commercial vehicles will also affect the financial position of the Commission. This last tax will also hit many members of the manufacturing and distributing industries, particularly those operating vehicles under "C" licences, of which there have been a great increase in the last two years.

Further Increase in B.T.C. Costs

IN some quarters it may be argued that this purchase tax, coupled with the higher road fuel costs, may have beneficial results ultimately for the nationalised transport undertakings, because of the sharp increase in running and replacement costs of private operators which will be brought about. On the other hand, it must be recognised that nationalised transport itself will have to bear similar burdens. The Budget emphasises the need for a Government decision on the British Transport Commission's application for higher freight charges now before the Minister and for a Government statement of policy as to how the ever-increasing costs of the Commission are to be dealt with. The additions which have been made in the Budget to the operating expenses of the British Transport Commission, inevitably must increase the weekly net revenue deficit. The higher freight charges which have been proposed by the British Transport Commission would go only part of the way towards bridging the gap between estimated revenue and expenditure for the current year, and that gap now has been widened. There is very unlikely, now, to be any change left to the Commission from the £3,000,000 a year, which it hopes to secure as a result of the changes it is putting forward under its scheme of passenger charges for the London area.

Railwaymen's and Engineers' Wage Claims

THE claim by the N.U.R. for a £5 a week minimum wage for lower-paid staff was rejected at the meeting of the Railway Staff National Council last Friday, and the union may now elect to take the claim to the Railway Staff National Tribunal. Some indication of the lines along which the union leaders may be thinking may be inferred from the support given in *The Railway Review*, the organ of the N.U.R., to a suggestion by Mr. W. T. Proctor, M.P., that, until complete transport integration is achieved, the railway deficit might be met by a subsidy and rates not increased, on the grounds that it would facilitate an early wage concession to the railwaymen. If the only result of any steps taken to put railway finance on an even keel is to be to facilitate the granting of wage claims, which would again raise railway costs, the outlook is indeed grim for those who are seeking to provide an efficient and economical transport service. At a meeting on April 13, the Executive Council of the Confederation of Shipbuilding & Engineering Unions, which includes railway shopmen, discussed problems involved in the ballot papers which it had sent to 1,250,000 members of 37 affiliated unions, asking them to state whether they favoured strike action or arbitration on their rejected claim for an increase of £1 a week. A strike, which might involve nearly 3,000,000, would be the most serious threat to the arbitration machinery since the war.

British Transport Commission Traffics

RECENT changes in the Regional boundaries of British Railways preclude strict comparison between Regional statistics before and after the changes; the B.T.C. statistics for the second four-weekly period of the year given elsewhere in this issue therefore show for British Railways only total figures unaffected by boundary adjustments. Compared with the preceding period, there was a slight rise in British Railways receipts, more particularly for merchandise and coal traffics, also in those of British Road Services, and, more marked, of docks and harbours; London Transport railway receipts fell, as did those from nationalised road passenger transport, hotels and catering, and ships, the last showing a 27 per cent. seasonal decline

in passenger takings. Compared with last year, most headings show a decline except coal and coke by rail, docks, hotels, and, of course, road freight haulage with its acquisition of haulage undertakings during the year. The average railway wagon load, at 8·3 tons, was much the same, but increased slightly over the 1949 figure, while net ton-miles per total engine-hour rose from 558, in January, to 567, also a marked improvement on last year.

Southern Region Punctuality

DURING December, 1949, the standard of punctuality first issue of *British Transport Review* which is to month since the war. The average late arrival of steam passenger trains during the four weeks ended December 31 was 2·38 min., or 30 per cent. better than the result for the equivalent period of 1948; electric train arrivals improved by 54 per cent. to 1·87 min. In the Southern Region edition of *British Railways Magazine*, Mr. S. W. Smart, Superintendent of Operation, points out that this impressive improvement was achieved during a period which covered the whole of the Christmas holidays and the three weeks when working on the Eastern Section was heavily delayed by an earth slip between Lenham and Charing. The best day's average was 0·82 min. and the worst was 4·95 min. on December 23, when fog intervened, though weather was less of a handicap than it sometimes is at this period. Mr. Smart comments that the result reflects the greatest credit on all operating and motive-power staff and states that platform time is the key to punctuality under normal conditions, as a few seconds lost here and there soon mount up and cause further delays at junctions and terminals. The latest figures compared with those of previous years are shown below:—

AVERAGE MINUTES LATE ARRIVAL (WEEKDAYS)

	Four weeks ended				
	1945 Dec. 29	1946 Dec. 28	1947 Dec. 27	1948 Dec. 25	1949 Dec. 31
Steam	8·06	4·81	2·66	3·42	2·38
Electric	4·97	4·45	2·74	4·11	1·87
Freight	25·6	16·5	7·5	9·8	5·8

"British Transport Review"

AS we were closing for press, we received a copy of the first issue of *British Transport Review* which is to be published three times a year by the British Transport Commission (price 1s.). It is a well-produced journal, which does not deal with news, but contains a number of articles of general information on the policy and progress of the undertaking. It is designed primarily for administrative and other staff with special responsibilities or interests. The contributors to the first issue include Sir Cyril Hurcomb, Chairman of the B.T.C., who in the introduction has taken the opportunity to comment on the draft Charges Scheme. Mr. W. P. Allen, Staff Member of the Railway Executive, has written an article on joint consultation between management and staff; Dr. H. E. Merritt, Chief Research Officer, B.T.C., deals with investigation, imagination, invention, and initiative in research; Mr. F. A. A. Menzler, Chief Development & Research Officer, London Transport Executive, urges postponing all but essential maintenance work in an endeavour to reduce the "inflationary gap," and Mr. R. H. Wilson, Comptroller, B.T.C., deals with the accounting and financial structure of British transport. Other contributors are Major-General G. N. Russell, Chairman, Road Haulage Executive; Messrs. C. B. Clapham and E. F. Horabin, Assistant Secretaries, Road Passenger Executive, and Mr. E. R. Cottet, North-Western Area Superintendent of the Hotels Executive.

Eastern Main-Line Improvements in Victoria

THE development of the Yallourn Coalfield in Gippsland, Victoria, has necessitated extensive improvements in the Eastern District main line of the Victorian Government Railways. These improvements are the subject of an article on page 456, but it may be as well to point out that the most urgent work entailed is the construction of a new up line, approaching the 500-ft. summit near Drouin from the east or coalfield side with a 1 in 110 ruling gradient, in place of 1 in 50 against the load on the existing single line. Had not springs encountered in the 80-ft.-deep summit cutting delayed construction for a time, it is probable that earthwork between Warragul junction and Drouin would now be complete, and already some miles of track have been laid on that section. As soon as the new line between these stations can be opened, it will be used temporarily as a single line, to release the existing line for realignment and some regrading. In connection with these works the west end of Warragul yard is being remodelled, and electric signalling and points operation is being installed. Automatic colour-light signalling will eventually be provided on this line.

Traction Motor Design

IF the demand for advance copies is a criterion, Messrs. Fletcher and Binney's paper before the Electric Traction Convention on modern traction motors and gearing, summarised elsewhere in this issue, excited more interest than almost any other paper. This is not surprising: the absence of an authoritative textbook on traction motor design is a common cause for complaint among electric traction engineers and is probably the most serious omission from the literature in a field of technology which is in general badly served for textbooks. It cannot be said, nor would the authors claim, that the Convention paper was more than a survey of current practice and, as such, of little practical value to the designer in getting down to details of the design of a particular motor. Those who devote their careers to this branch of electrical technology are few and in great demand. They are found, with few exceptions, in industry rather than in the academic fields where the writing of textbooks is an acknowledged pursuit for which time is available. We hope, however, that in view of the gap in the literature, some of our eminent traction motor designers may feel the urge to perpetuate their name alongside those of Miles Walker, Dover, and others, who out of their knowledge and experience have provided a guide for their successors.

A Confusion over Bell Signals

THE collision at the Oakley Viaduct on October 4, 1949, when an engine and wagons plunged down to the river bank with fatal results to its crew, was inquired into by Colonel D. McMullen. We publish a summary of his report in this issue. A signalman, confused originally by something else, imagined he had received "out of section" for a goods line worked permissively on the telegraph bell system, but with only one common bell for those lines and the adjacent passenger tracks, an arrangement which the report characterises as undesirable and which, we are surprised to read, still exists at nearly a third of the signal boxes concerned on the London Midland Region. It is recommended to instal separate bells as soon as possible and to consider modifying the procedure so as to introduce some form of "offering" trains on the goods lines, instead of sending them forward unwarned or not, according to whether the "out of section" signal has or has not been received. We cordially agree with what Colonel McMullen says about the habit formed by some signalmen of using the block bell to call an adjacent colleague to the telephone, as we once saw a narrow escape from an occurrence following a confusion created by this misleading practice. One of the pre-grouping railways had a very strong warning against it, printed in its appendix to the working timetable.

Indistinct Code Bell Ringing

ALTHOUGH badly-given block bell signals were not actually involved in this case it is opportune, in view of the dependence placed on the correct reading of such signals under the telegraph bell system, to refer to what cannot fail to be noticed by anyone who listens attentively to the working in signal boxes, namely, that some men develop the bad habit of giving block bell signals hastily and indistinctly. At a station we are familiar with, where the signalbox is usually closed, there is a repeating bell in the block circuit for the benefit of the station staff, and it is safe to say that quite half of the bell signals

heard are indistinctly given, especially the acknowledgments, themselves frequently reduced to a mere jumble of beats. If this bell were at a crossing gatehouse the man in charge there would have great difficulty in determining from its signals what was the correct state of affairs. Signalmen should realise, and be taught to do so, that careful and clear block bell ringing is the first duty they owe to their colleagues and themselves, and that carelessness in this respect sows the seeds of serious consequences, especially if there is a crossing in the section where the codes are intended to be distinctly heard and convey important information affecting the use of the roadway by the public.

Nationalised British Railways

THE Transport Act, 1947, came into operation on January 1, 1948. Under its provisions all the major railways, and a number of smaller undertakings, passed into State ownership. Control of these and other transport services taken over by the State under that Act have not been directly operated by a Government Department, but by a number of Executives responsible to the British Transport Commission. The first two years of the life of so vast an undertaking as British Railways, leaving aside the other transport agencies, such as inland waterways, docks, road transport, and railway hotels and railway catering, which also came within the sphere of the Transport Act, either wholly or in part, obviously must be a period of organisation and consolidation. This is particularly true when one has regard to the ultimate objectives of the Transport Act, which looks to the provision of an efficient, adequate, economical and properly integrated system of public inland transport and port facilities within Great Britain, and also envisages all the businesses carried on by the Commission as forming one undertaking.

Only the most optimistic could have hoped for the early achievement of integration of such diverse forms of transport. Before any marked progress could be made in this direction, it was necessary to achieve unity in each of the major separate agencies. British Railways in their constituent parts were already large undertakings, which had achieved within themselves a considerable measure of standard practice and had, over all, a broadly common division. Nevertheless, there were in many instances considerable variations between the four companies merged into the nationalised railways organisation which had developed as a result of particular needs and experience in the areas served by the former undertakings.

It could not be expected that the merging of four great railways, each with its own traditions and customs and loyalties, could be achieved without arousing controversy, both internal and external, as to the best form the new organisation should take. The manner in which the transfer from private to public ownership has been achieved has been a tribute to the officers and men of the railway service, who have given of their best to ensure the smooth working of a new and vaster organisation.

In many parts of the world the changes on British Railways, and the reorganisation by which they are being effected, are being watched with the closest interest. Outside the United States of America, State ownership of railways is not new. But so large-scale a transfer from private to public ownership is unique in railway history, and has added interest because it has occurred in Great Britain, which was not only the birthplace of railways, but which has played so large a part in introducing railways to overseas countries. It is widely appreciated that whatever the political future of Great Britain may be, it is in the highest degree unlikely that British Railways will ever return to private ownership, and interest therefore centres on the best means by which the greatest efficiency and most successful operation can be achieved.

The change-over from private to State ownership in the case of the railways has been accomplished without, in the main, any change in the personnel of the previous systems, other than those which normally might have been expected to occur by reason of retirement or other similar causes. The railways are still operated and conducted by the same men, with the same traditions of public service, as before the passing of the Transport Act. At the head of the Railway Executive is Sir Eustace Missenden, to whom tributes were paid from both sides of the House in a recent debate in the Commons. Mr. J. A. Boyd-Carpenter, Conservative Member for Kingston-upon-Thames, referring to his "career of great distinction with the Southern Railway," of which he was the last General Manager, said that Sir Eustace Missenden was "a very fine choice for the responsible job which he now holds." From the Labour benches, Mr. Percy Morris, Member for West Swansea, said that the family spirit which had been a marked feature of the Southern Railway had not departed, and Sir Eustace Missenden's ability was "no less because he was now serving the country and not the directors and shareholders of the Southern Railway."

Elsewhere in this issue, Sir Eustace Missenden, who has been Chairman of the Railway Executive since its formation in 1947, contributes the first of two articles dealing with the initial two years of British Railways under national ownership. These articles give a detailed appraisal of the problems which the administration has had to face in 1948 and 1949 and the progress which it has been possible to make during a time of considerable difficulty. Sir Eustace Missenden explains the policy which the Railway Executive, as agent for the British Transport Commission, is pursuing. The articles will answer a number of questions which have been raised both at home and abroad, and they are the most authoritative survey of the position which has been published.

The Chairman of the Railway Executive makes quite clear that the present organisation is not fixed for ever, and that he looks forward to the time when a greater devolution of responsibility, in some spheres, from the central Railway Executive to the Regions will be possible. In the early stages it has been necessary to vest considerable authority in the Railway Executive headquarters in an effort to bring about unification of methods and equipment as quickly as possible, but it is appreciated that it is not decentralisation to have Regions, if all decisions have to be made at headquarters, and Regional Officers are merely intermediaries in seeing that they are carried out.

During the last two years much of the groundwork in determining the rôle of the railways and dovetailing them into a properly integrated system of inland transport has been prepared. This has been done side by side with the laying of the foundations for the organisation and operation of British Railways as a unified system.

The annual report and accounts for 1949 of the British Transport Commission will be available during the summer; obviously it has not been possible for Sir Eustace Missenden to anticipate that document in so far as it deals with facts and figures relating to results during 1949. That is not the purpose of these articles, which are concerned with the policy being pursued by those whose responsibility it is to achieve success with British Railways, and the organisation by which that end is to be attained.

International Railways of Central America

UNPRECEDENTED winds and rains, and labour troubles in Guatemala and El Salvador prevented the 1949 revenue of the International Railways of Central America from exceeding the record established in 1948. The report for the year ended December 31, 1949, states that the total cost of flood damage was nearly $729,000, and that banana traffic was much reduced by the labour difficulties of exporters. The operating ratio was 93 per cent., compared with 82 per cent. for 1948 and an average of 67 per cent. for the preceding ten years. The following are some of the chief financial results:—

	1948	1949
	$ thousands	
Operating revenue	13,334	12,395
Operating expenditure	10,926	11,554
Net operating revenue	2,408	851
Taxes, charges, etc.	1,050	684
Net income	1,358	167

In Guatemala, a wage dispute with the national railway trades union resulted in an order by the Labour

Court of Appeal to the railway to pay heavy wage increases; despite which the union has pressed a number of further demands. In El Salvador, a fifteen-day strike in May, 1949, ended after the Government had ordered the company's Manager, Mr. J. H. Wilson, to leave the country within 72 hours.

Dividends amounting to $2·50 per share of preferred stock were declared in 1949. In view of the unsettled labour situation and heavy cost of repairs to flood damage, the directors have deferred action as to further dividends.

Commercial Train Services

THE importance of a liberal and punctual train service to enable business men to travel from London to the provinces, and vice versa, and return the same night, is in these days obvious. Articles on this subject in recent issues of *The Railway Gazette* show that, on the whole, the opportunities given to visit London and return the same evening are good. In some cases they are very good, as, for example, from Manchester or Leeds; from these cities, in addition to an early morning departure giving six or seven hours in London, there is a later service around 10 a.m., allowing a full afternoon in London and enabling passengers to transact morning business before starting. Restaurant facilities are adequate, and there is little overcrowding. But for London business men travelling to a provincial town for the day the position is much less satisfactory, and the proposals made in the articles are directed to improving such services.

Reconstruction of commercial services since the war has been more rapid on the Continent than in Britain. In Germany, France, and elsewhere the double journeys made in one day by business men, up to 1939, were far longer than was possible in Great Britain, even by high-speed, extra-fare trains, and morning departures were at a much earlier hour. Commercial services between Paris and Lille or Le Havre, and over longer distances such as Paris to Lyons and Nancy, are nearly at pre-war level, and French cross-country business services are better than in Britain. Cross-country services have not been dealt with in our articles, but those between Birmingham and the Eastern Counties, Birmingham and Liverpool and Manchester, the North-Eastern counties and Liverpool, and Manchester and Glasgow, are notorious examples.

The unsatisfactory position in Britain is largely the result of the war, and of the difference between the policies pursued during the first and second world wars. During the former, not only were minimum journey-times laid down for services between London and certain provincial centres, and passengers protected by the fixing of a maximum time which the best train must not exceed, but there was a definite allocation of passenger traffic, with the object of spreading the burden evenly between the different companies. During the 1939-45 war, however, in spite of much advice against unnecessary travel (though cheap monthly return tickets were retained), and train-service reductions which resulted in a certain amount of unofficial allocation, fast services from and to Marylebone and St. Pancras were so drastically cut and decelerated that Kings Cross had to bear almost the whole load of Yorkshire traffic to and from London, and Euston had to take nearly all Manchester business, which led to congestion and overcrowding. The balance has not yet been redressed, though Marylebone is once again catering for the old Great Central route Sheffield traffic.

To put these commercial services on a proper footing, the Great Central route should do more to relieve Kings Cross by developing its services *via* Sheffield to Huddersfield, Halifax, and Bradford, rather than to Manchester, while the Midland should be restored to its old position, share the Manchester business with Euston, and also offer a Leeds service which is a reasonable alternative to the old Great Northern route. Such additional mileage as has been recommended in these articles is entirely with this object, and not with any idea of restoring competitive services as such. Certain intermediate commercial traffics, however, such as Leicester and Leeds, depend entirely on a main line still suffering from the wartime policy.

As regards speed, a general acceleration, when conditions permit (on the lines, perhaps, of the regular-interval services already hinted at by the Chairman of the Railway Executive) is far preferable to the acceleration for publicity purposes of a few selected trains; it is certainly better from the operating point of view. Attention was called in our last article to the "Norfolkman," the London-Norwich service inaugurated in 1948, as a reasonably fast train of moderate tonnage; this might be the prototype for services in other areas where there is a good prospect of extra mileage attracting new business. Some acceleration, however, is bound to be undertaken before long, and the claims are pressed of the commercial services, recently reviewed, where a double journey of two or three hours' duration is made by business men in one day, as deserving priority over the acceleration of long-distance services, such as the Anglo-Scottish. The London and Birmingham service, for instance, needs early improvement.

In these and other cases closer timetable co-operation between the Regions concerned ought to be able to so space out existing trains as to provide better business facilities with little, if any, extra mileage.

U.S.A. Streamline Passenger Progress

IN its annual "Passenger Progress Number" dealing exclusively with passenger train services in the United States the *Railway Age* takes a hopeful view of the future. While it is true that passenger traffic as a whole at present is run at a loss, this is due mainly to the carriage of mail and express traffic at unremunerative rates, together with a regulation insisting that railways shall continue to operate subsidiary and branch lines that can only lose money.

The railways complain that no other form of transport is penalised in the same way and they realise that the road to redress from the Government can lie only in educating the public as to the inequality of the position. Meantime, except on such railways as the New York, New Haven & Hartford, which, with the patronage of its New York-Boston main line, is able to work its passenger traffic at a profit, American lines in general must use part of the profit from freight operation to meet passenger losses if they are to keep on the right side of the balance sheet.

Nevertheless it is clear that the U.S.A. railways are leaving no stone unturned to retain and extend their passenger business. The bright spot in passenger operation is the diesel-hauled streamliner and the introduction of new streamline trains. Many of these can be relied on to earn $4·00 to $5·00 a mile. Also, many well-known trains previously in service have been, and still are being, completely re-equipped with the latest streamline stock, and turned over from steam to diesel haulage. The "Parade of the Streamliners" lists a total of 147 daily long-distance services in the U.S.A., requiring for their operation 292 complete trains and comprising over 3,000 modern luxury vehicles, which between them now cover daily almost 200,000 route-miles of line. During the year to November, 1949, 29 streamline trains, comprising 49 sets of equipment, were introduced by 13 railways, and the process still continues.

The whole of this streamline enterprise dates from the introduction, in 1934, of diesel-electric power in long-distance train operation, coupled with the simultaneous introduction of lightweight rolling stock, which cut down the excessive weight of previous all-steel standard stock by 30 per cent. and more. With the smooth, smokeless, and greatly accelerated travel thus made possible, came the era of the reclining-chair car for the "third class" passenger, a variety of modern sleeping accommodation for the Pullman client, novel types of light-refreshment lounges, attractive schemes of furnishing and decoration, and the double-deck "Astra-Dome" and "Vista-Dome" cars.

It is a costly business to re-equip even one transcontinental train; for example, when the Great Northern and

Chicago, Burlington & Quincy Railways decided to convert the "Empire Builder" on the 2,211-mile Chicago-Seattle run into a diesel streamline train, it was necessary to provide five new trains of 12 cars each, with locomotive power to match, to maintain a daily service. Yet so popular has this accelerated train become, that, although it has been in operation in its modernised form only three years, an equal amount of new stock is now under construction for an entirely new set of "Empire Builder" trains, which will make possible a double daily streamline service over this route.

On dining car service the U.S.A. railways spent $113,700,000 in 1948 and drew in revenue only $82,300,000. This loss is likely to be increased in the 1949 figures because a 205 hr. month for dining car employees became compulsory in September last year. Though this deficit is serious, it is classed as "costs" rather than "loss," on the same footing as, say, maintenance of track or locomotives. Dining car service is regarded as essential, and it is recognised that, notwithstanding mechanical improvements, it will always impose some cost on the railways. Costs are swollen, also, by the fact that passengers refuse to be regimented into, and out of, restaurant cars at certain hours, and they expect to have available a very varied menu. Some savings have been effected by careful crew rostering, and in many minor trains snack bars have been substituted for full restaurant car service.

The development of fast passenger service in the United States is hampered by regulations imposed on the railways by outside organisations. In June, 1947, for example, the Interstate Commerce Commission issued an order to the effect that maximum train speeds must be kept below 80 m.p.h. on main lines not equipped with train-stop and train-control systems or continuous cab-signalling. The cost of carrying out this arbitrary requirement on long routes in the open country, carrying no more than one or two streamliners a day, would have been prohibitive relatively to the traffic concerned, and, therefore, some very fast trains which have operated with a high standard of safety since their introduction have been compulsorily decelerated, as, for example, the "City of Denver" and "Denver Zephyr" streamliners between Chicago and Denver, both slowed 30 min on the part of their run west of Omaha.

Wagon Standardisation and Design

IN a paper on the standardisation and design of goods and mineral wagons as applied to British Railways, read before the Institution of Locomotive Engineers on April 19, Mr. C. A. Gammon said that apart from older vehicles owned by the various main-line companies before the 1923 amalgamation, there were over 100 types, each embracing variations in design, constructed to the requirements of the former main-line railways. While the 1923 amalgamation brought about some degree of standardisation, it was not possible until the formation of British Railways to attempt complete uniformity of design. This lack of standardisation was often due to local circumstances at loading and unloading depots, although differing methods of production and workshop equipment also played a part.

Mr. Gammon dealt with the three types of wagons which constitute by far the greatest proportion of over 1,000,000 owned by British Railways, *i.e.*, open and covered goods and mineral wagons. With these, a considerable measure of standardisation—particularly of underframes and running gear—had already been achieved as a result of deliberations of the Carriage & Wagon Superintendents' (later C.M.E.'s) Committee, which, under the ægis of the Railway Clearing House, was formed in 1885, when an urgent need arose to formulate standards for the ever-increasing number of privately-owned coal and other types of wagons required to meet expanding industrialism. This Committee continued to meet regularly until the end of 1947; since the advent of nationalisation, this work had been carried on by a committee set up by the Railway Executive.

An Act of 1845 permitted private ownership of rolling stock, the design of which were approved by one of the then many railway companies, and this produced innumerable variations, due to absence of co-ordinated policy. In 1887 the first "standard" drawings and specifications became operative, laying down general dimensions for the body and certain components of coal wagons, and, while the railways gave effect to some of the features, they were under no obligation in this respect. Perhaps the first major improvement was the compulsory use of spring buffers; large numbers of wagons before then were equipped with "dead" buffers, all of which had subsequently to be converted.

A revision was made in 1907, which standardised most of the components, and a further partial revision was necessary in 1911 to incorporate developments in the capacity and structural details of wagons. From 1887 to 1911 the prevailing capacity of coal wagons and, indeed, most two-axled wagons, was 8 tons, with 10-ton and a comparatively few 12-ton wagons coming into the picture, but between 1911 and 1923 the building of the 10-ton wagon predominated. At the conclusion of the first world war a Committee appointed to consider the most economic capacity and dimensions, recommended 12 tons for goods and mineral wagons, the adoption of which resulted in the preparation of what became universally known as the 1923 standards for:—

(*a*) 12-ton timber underframe and steel underframe wagons complete for coal traffic; both with timber bodies;

(*b*) Timber and steel underframes only, for 12-ton goods wagons.

In each case the wheelbase was 9 ft., the lengths of coal wagons being 16 ft. 6 in., and goods wagons 17 ft. 6 in., dimensions which have remained until the present day. The designs were adopted generally by railways and private owners, but there was no attempt to standardise the bodies of goods wagons, the design being left to the individual railway companies. In 1924 similar standards were set up for 20-ton mineral wagons having steel frames, timber bodies 21 ft. 6 in. long, and a wheelbase of 12 ft., followed in 1928 by designs for bodies of riveted steel construction. The standard goods wagon underframes were used for open and covered types, but in 1927 an alternative constructed from lighter sections was introduced, and found favour particularly in the construction of covered vehicles, which offer better protection, and, therefore, resulting in less severe corrosion of the members. This construction had, however, shown itself prone to distortion, and had now been discarded.

Fundamentally, the layout of the underframe has not altered, but consideration is being given by designers to an entirely different arrangement of members. Developments in the design of components and running gear, however, have progressed, and a considerable measure of standardisation has taken place over a number of years, enabling interchange of many components to be effected by any Region without special ordering from the parent Region, with its consequent delay and the holding of vehicles out of service; the process has now been extended throughout to the complete vehicles, and will lead to more economical production and maintenance.

Standardisation in itself might lead to stagnation in the development of new and improved ideas, but, while it is obvious that any form of standardisation must be maintained for a time sufficient to provide the best service and economies, it cannot and must not remain static, but be progressive. New ideas, improvement in production methods, and the exploitation of new materials will constantly exercise the minds of designers, having always in mind that components wherever possible should be interchangeable with those existing, thus keeping the manufacture, repair, and holding of stock items to a minimum. The work must be regarded as a stage in a continuing process, which at present has largely been concerned with consolidating past standardisation and the best of existing variables; much work remains to be done before all the requisite types of wagons have been dealt with, and many years must elapse before the older designs are eliminated.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Diesel Locomotives for South Australia

February 24

SIR,—I notice that in an article dealing with the South Australian Railways in your issue of November 18, 1949, it is stated in the third paragraph, page 579, that this railway system is purchasing ten 1,500-h.p. diesel-electric locomotives from the United States of America. Possibly this information was culled from our annual report for the year ended June, 1948, but due to dollar difficulties the proposition was not proceeded with, and an order has now been placed in Great Britain for the manufacture and supply of ten diesel-electric locomotives, each 1,760 h.p.

Yours faithfully,

P. F. CHERRY,
Secretary

South Australian Railways, Adelaide

[The placing of the order with The English Electric Co. Ltd. was recorded in our February 24 issue.—ED., *R.G.*]

Travel in England and America

April 10

SIR,—Adverting to Messrs. Gobel and Grader in your issue of April 7, I hardly think that there is any comparison between the Great Central and Midland main lines over here and the two mentioned in the U.S.A., which are to all intents and purposes subways and/or interurbans.

The whole point is that if the incidents that have been reported in your journal took place in the U.S.A., then the attitude of "couldn't care less" as practised by the Railway Executive here would never have been tolerated by the American railway companies, operating under private enterprise.

I have travelled extensively in America, but I have not been on either of the lines mentioned by Messrs. Gobel and Grader.

Yours truly,

V. BOYD-CARPENTER

Revision of Regional Boundaries

April 12

SIR,—I should like to comment on the points raised by Mr. G. Leiser in your issue of April 7.

Although the London Midland suburban electric lines in London possess interchange stations with London Transport at South Acton, Gunnersbury, and Queens Park (*not* Willesden Junction), they form an integral part of the London Midland London suburban system as a whole, linking as they do Watford Junction with Euston, Broad Street, and Richmond.

A double royal poster map of the suburban electric lines, displayed by the L.M.S.R. before the war and illustrated in your issue of September 27, 1935, clearly showed all interchange stations with London Transport and other lines. This will also be one of the features of a new double royal diagrammatic poster map, showing all London Midland lines Euston—Bletchley, Broad Street—Richmond, St. Pancras—Bedford and Kentish Town—Barking, which is being printed at the present time for display at all stations in the area indicated.

London Transport, on its part, shows interchange stations with British Railways on its various carriage route diagrams, although, probably for reasons of clarity, it does not do so on its quad royal poster map.

Because of the war, a comprehensive scheme evolved by the L.M.S.R. for improving old North London stations had to be shelved. It is now being re-examined. A scheme for improving the general display of signs, traffic advertising and so forth on the frontages of these stations has been prepared during recent months, and this will be put in hand in the near future.

There is a frequent service of trains on the London Midland electric lines to Watford, over which through trains run from the Bakerloo line *via* Queens Park. On the North London line between Broad Street and Richmond the passenger service has only recently been increased, and there is now a quarter-hourly service in the non-peak periods. During business hours the service is, of course, more frequent.

Yours faithfully,

GEORGE DOW
Public Relations & Publicity Officer

British Railways, London Midland Region, Euston House, London, N.W.1

Fare Anomalies

April 1

SIR,—I have today obtained a copy of the Southern Region's Chatham Navy Day's leaflet, the contents of which make strange reading.

From my most convenient station, Purley Oaks, a day return fare of 7s. 9d. is quoted. East Croydon residents are invited to pay 9s., although the distance between these two stations is but 2 miles 6 ch.; unfortunate South Croydonians (whose station is approximately midway between Purley Oaks and East Croydon) are called on to pay 9s. 3d.

From Purley the fare is 7s. 9d., but 9s. 3d. is quoted for Kenley, distance 1 mile 16 ch., or 1½d. each way by bus.

I would have read further, but realised the date—April 1—which explains it all!

Yours faithfully,

BERTRAM C. VIGOR

12, Edgar Road, Sanderstead

Main-Line Electrification Systems

February 22

SIR,—It seems fairly certain that in the not too-distant future extensive main line electrification will be carried out in this country. Therefore I again appeal that the merits of high-voltage single-phase current be studied impartially before extensive work is carried out on the 1,500-volt d.c. system.

I admit that one of the merits of the d.c. system is that it is better understood by engineers in this country than the single-phase system. My own view is that merits of single-phase are so much greater than d.c. for heavy traction that lack of engineers trained in the single-phase system should not be a deterrent, especially as it seems to be the fashion these days to import foreigners to teach us.

The South African Railways Class 3E electric locomotive is much heavier than the Swiss railways single-phase locomotive Class 251, yet the single-phase locomotive can do much more work at practically all speeds, its weight being 80 *tonnes* and nominal h.p. 4,000, at the one-hour rating, and is capable of exerting 48,000 lb. t.e. under average circumstances. I submit such a locomotive would meet all normal requirements of British Railways, and this with an axleload of less than 20 tons.

It seems to be necessary with d.c. locomotives when 3,000 h.p. is required, for the locomotive to weigh over 120 tons. With this adhesion weight 69,000 lb. t.e. is possible but unnecessary; I am thinking primarily of passenger locomotives. Generally speaking, when the gearing is arranged so the motors can put out this high tractive effort at starting without damage, the nominal rating of the locomotive is reached at comparatively low speeds, say 35 m.p.h.

Where our present steam locomotives fall down operationally is not in their inability to start a heavy train from rest, but failure to be able to take heavy trains up all gradients at a reasonable speed.

If railways are to survive as a competitive means of transport, locomotives are required that will take main-line

trains up a gradient of 1 in 100, at nominal speed of 65 m.p.h. What does this mean in terms of h.p. and t.e. for a 500-ton train and a 100-ton locomotive on this gradient? A rough calculation indicates that about 22,000 lb. tractive effort is required and about 3,800 h.p. On a grade of 1 in 80 these figures will be pushed up to about 25,000 lb. t.e. and 4,000 h.p. at 60 m.p.h.

So it will be seen that a locomotive of 80 tons weight (providing the horses can be got in) is heavy enough to do this duty. It would even accelerate a 500-ton train from a standstill on this grade of 1 in 80 at about 0·3 m.p.h.p.s. As I see the situation, no d.c. locomotive as yet built can get 4,000 h.p. with a total weight of 80 tons only.

Generally speaking, costs are roughly in proportion to weight, so one is led to suppose that the cost of an a.c. tractor is in the relationship to a d.c. tractor of 80 to 120/130. So much for the tractors. It was established many years ago that the cost of the overhead equipment for the a.c. high voltage system was less costly than the equipment of the d.c. system at 1,500 volts. We now come to the part which, in my view, finally clinches the matter. I refer to research which is now going on regarding the use of standard industrial frequency of 50-cycles current for traction and results so far are very promising.

I have not mentioned the possibilities of the many different types of tractors which are available on single-phase supply, such as rectifier-type locos, motor generator type (which I favour most), phase changers, and so on.

So there is then, I submit, a strong *prima facie* case for the a.c. system. Lest some of your readers contend that such a performance as I have outlined is not required, I can only state that I think it is the minimum if our railways are not to become museum pieces.

Yours faithfully,

H. CHARNLEY

Brook House, Clayton-le-Woods

Links Between Track and Train in A.T.C.

April 11

SIR,—In reply to Mr. Cooper's letter in your issue of April 7, I am afraid the responder beacon system mentioned would not fulfil the conditions required of a signalling system, as if the responder failed to function, it would be a "wrong side" failure. It seems to me that whatever system is finally evolved, it will be based on the application of transmission line theory to the running rails, which will carry minute high-frequency currents.

A radar system of signalling would have advantages over existing forms of signalling only if it fulfilled the conditions summarised in the last part of Mr. Cooper's second paragraph, namely, if it provided a continuous warning of approach to an obstruction, combined with measurement of its proximity.

This is the only way in which maximum track capacity can be achieved by signalling, as distinct from improvements in braking and traction systems. What it really means is doing away with fixed block sections, as provided by track circuits or manual block, and substituting what might be termed a "moving block section," that is, one which moves along in front of each train. When this is accomplished, whether by radar or other means, it would appear that finality will have been achieved in the provision of maximum track capacity, as far as signalling is concerned.

It follows from the above that doing away with fixed signals is essential, except as junction indicators, and perhaps at interlockings, where precise clearance points are required. It may be that since the days when I was associated with radar, improvements have been made in the precise measurement of distances, which would render the latter unnecessary.

Such a system, by its very nature, would meet all the conditions in which a check on speed is necessary, as the driver would be told at any instant the distance he had to run before reaching an obstruction (unless Mr. Cooper means a permanent way restriction, which is hardly a function of signalling, although no doubt this could be accomplished). By the same means, the driver would be told of the stopping point, whether an actual train ahead, or a phantom obstruction imposed by a signalman for traffic purposes or for a compulsory speed check.

Yours faithfully,

D. DOWNES

124, Wynchgate, Winchmore Hill, N.21

New Underground Tickets

February 4

SIR,—With reference to the note which appeared on the Scrap Heap page of the issue of January 27, I am surprised that I have not seen public protests at this form of ticket.

Surely it is a first principle of tickets that they should state the destinations to which they are available as well as the price? Is there no law or regulation or order which ensures this by statutory means?

Sympathy for ticket collectors may be extended by the public, but I imagine that most people who do not make regular journeys between particular stations really want to know how far they are entitled to travel. The solution to the problem would seem to be to list the destinations on one side of the ticket and the place of departure on another.

Sooner or later some stranger to London is going to buy a ticket at Oxford Circus and then during the journey get muddled in changing, glance at the ticket and the instructions as to destinations on the interchange station—and re-appear at Oxford Circus expecting to have arrived at the place he started to reach!

Further to the thought that every passenger is entitled to know how far he may travel without being liable to being charged with travelling with intent to avoid paying a fare—if London Transport standardised the use of the new ticket the public should demand that in each compartment of a train the complete fare lists should be available for them to study. Otherwise the new ticket would be an imposition which should not be tolerated.

Yours truly,

N. R. RICE

"Two Winds," Beckenham

Diversions on Four-Track Lines

March 24

SIR,—I was interested in the final remarks of Mr. J. B. Latham in your issue of March 24. I was in the Surbiton district from roughly 1925 to 1930, and, although I also am an amateur, I had an intimate connection with the line. At that time, there was either no instruction about the precedence of electrics, or, if there was, it did not get much attention.

Main-line expresses were given a clear run as far as possible, whether on time or late, and the others fitted in as circumstances permitted. Certain trains were booked to be diverted from one line to another at such places as Hampton Court Junction, Surbiton Station, Marsh Lane (now Berrylands), Raynes Park, and places further afield; if anything was running late or out of place, then trains were often diverted at other than the normal place and so kept practically on time at stations. The arrangements between signalmen as to which train was to be diverted at which place were often involved, but eminently satisfactory.

I have no information of conditions today there or at Woking, but it is possible that an electric may be let out in front of a steam train if it is the faster and can be parked out of the way at a station by the time the steam train gets there. One of the best pieces of work of this sort I know took place between Paddington and Maidenhead, the train that I was on weaving from main to relief and back again at every crossover and overtaking another train on the other line each time. At what level this was arranged I do not know, but I have never seen anything like it before or since.

Yours faithfully,

COURTENAY BARRY

The Old Manor, Salisbury

THE SCRAP HEAP

First Victim of Volk's Line

What is stated to be the first fatal accident on the Brighton (former Volk's) Electric Railway since its opening in 1883 occurred on April 11, when a child slipped off a concrete ramp and fell in front of one of the coaches.

"Commercial" Travelling

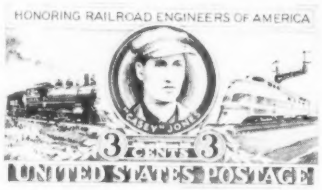
A correspondent writes:—"I had rather an amusing experience coming from Glasgow to Perth last week. Two 'commercials' were in the compartment, one for Forfar and one for Pitlochry. Both took 'day' tickets to Stirling, nipped out there and re-booked 'day' to Perth (there is ample time to do this, and a train close behind if there happened to be a queue at the booking-window), and then did the same at Perth! They proudly explained that by this means they easily covered their day's expenses, food, and so on. I knew this was going on, but this was the first time I had actually seen it—and it is a typical result of the fares policy."

An Unusual Bracket Signal

We have recently received from Mr. Derrick J. Brough, of Cheam, Surrey, a photograph of an unusual bracket signal at Greenisland Station, Ulster Transport Authority. The signal is of the somersault type, and its main post, cross-beam, and doll are of reinforced concrete. When the signal was erected a second arm was mounted on a separate doll on the extreme right of the cross-beam, though both the arm and its doll were removed at a later date, and to preserve the equilibrium of the structure four large slabs of concrete were placed at the end of the cross-beam as a balancing weight. This unusual system is illustrated in the photograph reproduced below.

Casey Jones Stamp

Centrepiece of a new U.S. stamp is Casey Jones, America's most famous engine driver. He was killed in the wreck of the "Cannonball Express" near



Vaughan, Mississippi, on April 30, fifty years ago. The express ran into a goods train. The fireman jumped, but Casey Jones stayed to blow the whistle to give the goods train crew time to escape. His sacrifice is commemorated in an American folksong.—*From the "Evening Standard."*

Gold Railway Passes

A statement in *The Scotsman* on the recently issued Royal Mint annual report for 1946 draws attention to a note that in that year the Mint produced 79 eighteen-carat gold railway passes. Before nationalisation various persons were given the passes granting them free travel on the lines of the particular company issuing them. British Railways has since assumed this responsibility of free travel, and many of the passes are still in use. The 79 passes produced at the Mint in 1946 were for the L.N.E.R., and as a number of persons who had been granted passes had not claimed them at the time of nationalisation, the Mint has continued to make some in the name of the L.N.E.R. The other three main-line companies had arrangements with various goldsmiths for the production of their gold passes.

Glasgow v. Edinburgh

We hear from a correspondent at Carstairs that first- and third-class tickets are given by all trains to Glasgow and Edinburgh. The Glasgow fares (28¾ miles) are 4s. 9d. (first) and 3s. 2d. (third). Edinburgh fares (27½ miles) are 7s. 2d. and 4s. 9d. Another case for Edinburgh folk to complain of preference to Glasgow, he comments.

Kaleidoscope

Ah me!—I gather that's the way
A poet prefaces his lay
Whene'er, distraught, he seeks relief
From moods of longing or of grief;
At any rate, 'twill have to do
My words with pathos to imbue,
For 'tis my lot to suffer, for my pains,
Our railway trains.

What livid hues affront my gaze,
Born of this standardising craze
That doth presume our trains to take
And drown them in a crimson lake,
And perpetrates things even cruder,
Like buffet-cars in pseudo-Tudor,
And tries a diet of spilt milk
And other potions of that ilk!
What feeble fare, when I would deem
Great Western choc-o-late and cream
A rich repast, or fain would swoon
At thought of L.M.S. maroon,
Or sense in brown of L.N.E.
A hint of bracken 'neath the scree!
And Southern green—what? glorious shade
For sapient bucolics made!
Such were my gentle pleasures; and to think—
Oh, strike me pink!

What sameness hath this pattern strict
With which our railways are afflict!
How Tommy must regard with pain
His Hornby British Railways train!
And how can boys pursue their caper,
With pencil and with grubby paper—
'Mid shrill contention, while the bank they cumber—
Of "What's its number?"

Ah me!—I've mentioned that before.
Excuse me, but I'd set such store
By all these visions of a brave new world
In which a thriving populace is whirled
From end to end of Britain—whisked, indeed,
With comfort, punctuality and speed;
A dream wherein, with coffers overflown,
I'd proudly claim the British Railways as my own!
And yet—'tis strange—I hardly dare
Enquire the fare to anywhere,
Because I know that I shall have to dock it
From my pocket.

G. R. B.

Following the removal of a second doll, the equilibrium of this bracket signal at Greenisland Station, Ulster Transport Authority, has been preserved by four large slabs of concrete placed at the end of the crossbeam

Photo] [Derrick J. Brough

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Rolling Stock

In his recent Budget speech, the Minister of Transport, Mr. P. O. Sauer, gave the present establishment of the Administration's rolling stock as 2,678 main and branch line saloons, 1,196 suburban saloons, and 129 narrow-gauge coaches. There are 270 electric motor coaches, 147 driving trailers, and 553 plain trailers, giving a total of 4,973 passenger coaches. Orders have been placed for 216 main-line saloons, 49 suburban saloons (steam services) and 72 electric motor-coaches, and a further 298 main-line and 52 suburban saloons (steam services) as well as 13 electric trailers and 62 vans are being built in the Administration's workshops.

When these additional units are received, there will be a total of 5,735 of all types, and it ought then to be possible to meet passenger traffic demands, at the current rate of increases, for some time to come.

During the last calendar year 7,495 new wagons went into service, but wastages amounted to 286 bogie and 852 four-wheel wagons. The present establishment consists of 39,431 bogies and 31,235 four-wheel wagons on broad-gauge lines, and 1,465 wagons on narrow-gauge lines. On order or being built are 9,063 bogie and 1,500 four-wheel wagons. These additions will give a total of 48,494 bogie and 32,735 four-wheel wagons. The average annual wastage is 615 wagons of all types.

With the 103 steam locomotives which came into service last year, and 50 scrapped, the railways now have 2,480 locomotives. In addition, there are 216 electric units and two diesel shunting engines. Provision has also been made for the acquisition of 477 more steam locomotives during the next few years. These will be ordered as and when necessary, having regard to wastages which, during the last five years averaged 24 locomotives a year, but are expected to be heavier in future.

TASMANIA

Dual-Purpose Livestock Wagons

Consideration is being given to the introduction of dual-purpose livestock wagons to be effected by constructing a movable upper floor, which can be raised to the roof when the wagons are required for cattle traffic, or conversely lowered if required for sheep traffic. Besides providing a greater reserve of rolling-stock considerable empty mileage would thus be economised.

Back-Loading of Cattle Wagons

Experiments are being made with the object of organising the back-loading of cattle trucks from the zinc works at Risdon in the south to stations in the north and on the north-west coast. To protect the consignments from damage by rain water the spaces between the slats on the sides of the wagons to a height of three feet from floor level are being boarded in. The bottom space is being left open, to allow wash-out water and excrement to drain away, and a drip board being placed over the top of this space to keep out rain.

By this means two tarpaulins instead of four will suffice to cover the outside of the wagons. To prevent damage to the paper bags by the cleats on the floors of the wagons it has also been arranged to lay condemned tarpaulins over the floors and also to cover them with sawdust.

Freight Rates

Higher rail freight rates in Tasmania are under consideration by the Government, but it is reported that no decision will be taken until the State Finance Committee has made a complete investigation.

The Joint Committee of both Houses of Parliament, which enquired into transport matters in 1949, reached the conclusion that there must be a further review of existing freight rates, stating in its report that from the evidence submitted it was obvious that the major loss on the railways is incurred because almost every class of freight is carried far below the actual cost.

BURMA

Restored and Curtailed Services

Services on the Rangoon-Pegu main line were restored on February 7 when the first passenger train for more than a year left Rangoon for Daiku. All stations have been reopened, but Kyauktan is a "halt" for the time being. This is the first step in the great task of restoring through communication between Rangoon and Mandalay.

The Letpadan-Tharrawaw and Letpadan-Okkun services were suspended from January 18 to February 20, and January 21 to February 14 respectively, due to the blowing up of bridges. To conserve coal, the Maymyo-Nawnghkio, Nawngpeng-Lashio, and Mandalay-Maymyo services run only three times a week

ARGENTINA

Second Anniversary of Takeover

The second anniversary of the taking over by the Argentine Government of the British-owned railways, March 1, 1950, was celebrated by a mass meeting in front of the headquarters of the General Belgrano Railway, speeches being made by Señora Perón, the Minister of Transport, and the presidents of the railway unions.

Innovations on San Martin Railway

The General San Martín Railway has begun the construction of 250 box-type wagons in its Junín workshops. The same railway is carrying out trials with facing points of a new design which, it is stated, will allow the fastest expresses to traverse them without reducing speed

President of Directorate Visits U.S.A.

Colonel J. R. Zubieta, the recently-appointed President of the National Railway Directorate, accompanied by six other officials, has paid a short visit

Climbing North from the Cape

Goods train in the Hex River Pass, South African Railways

to the United States. During his stay, Colonel Zubieta visited the works of the Pullman Company in Chicago and the General Motors diesel engine works at La Grange, Illinois; the repair shops of the Pennsylvania Railroad at Altoona and the works of makers of signalling equipment in Boston were visited by the other members of the group.

Emphasising that his visit was for study alone, he stated that diesel traction will entirely supersede steam traction on the Argentine railways at some future date, dependent on many circumstances, not the least of which was cost. He added that he was favourably impressed with what he had seen, and was convinced that much of the railway equipment required by Argentina could be bought in the U.S.A. and nowhere else. Especially in the field of diesel development he found that American experience outstripped that of all other countries.

Argentina, he said, had diesel contracts in Hungary and Italy, and also had many outstanding orders for other equipment in Great Britain, but there were no further commitments after these were fulfilled. Renewals and replacements would have to be studied on the basis of quality, price, delivery dates, and availability of foreign exchange. A full report would be presented to the Minister of Transport on his return, covering diesel engines, rolling stock and spare parts.

PERSIA

New Lines

Construction work on the Teheran-Meshed and Teheran-Tabriz routes are going ahead and, in all, some 15,000 men are employed on them. The existing termini are at Sharud and Mianeh, where the eastern and western constructions, respectively, were halted some years ago. Roughly half of the 310-mile Sharud-Meshed section is now ready for platelaying, and funds are available for about 90 miles of track. The other half also is progressing satisfactorily, and earthwork is in hand; some is finished and there ballasting is proceeding. Earthwork is also in progress on the 186-mile Mianeh-Tabriz section, but none is yet ready for track laying. This is due mainly to the mountainous country traversed, and several long tunnels are entailed. According to programme, both lines should be open for traffic within three years, the Meshed line probably considerably earlier.

CYRENAICA

Change of Administration

The former Benghazi, Barce & Soluk Railway was renamed the Cyrenaica Railway in April, 1949, and passed to the control of the Public Works Department of the Government of Cyrenaica in October, 1949. Four mixed trains are run a week, on each of the three sections. The system totals 103 miles, all 3 ft. 1¼ in.

Publications Received

Resistance Welding in Mass Production. By A. J. Hipperson and T. Watson. London: Iliffe & Sons, Ltd., Dorset House, Stamford Street, S.E.1. 8½ in. × 5½ in. 278 pp. Illustrated. Price 21s. net. The subjects dealt with in the publication include the first principles as applied to spot, projection, seam and flash and butt welding and hot riveting and its scientific application. The book contains material which will be of interest to welding and production engineers and designers. Special reference is made to design and production requirements from the point of view of maximum results to be obtained and the design of jigs and tools as applied to mass-production welding.

Safety on the Track.—Written by R. J. MacLeod; drawings by Alec Gorton. Office of the Civil Engineer (Maintenance), Chief Engineer's Department, London Transport Executive, 55, Broadway, London, S.W.1. 4½ in. × 7 in. 66 pp. Paper covers. —Men who work on or about the permanent way must always be on the alert to prevent accidents both to themselves and to others, and, as many accidents could be avoided by the exercise of more care, together with a knowledge of the risks, London Transport has produced this booklet which, in straightforward English and by amusing illustrations, describes the risks and the best method of avoiding them. The author is Mr. R. J. MacLeod, an Assistant to the Permanent Way Engineer, and the illustrations are by Alec Gorton, a District Inspector with London Transport Railways. The booklet, which is being distributed to every member of the permanent-way maintenance staff, supersedes a pre-war publication on safety first, and is stated to be proving popular not only with the staff for whom it was primarily written, but also with those of other departments whose work takes them on to the track.

Danske Statsbaner 1949 (The Danish State Railways in 1949).—This illustrated souvenir in Danish, issued by the Copenhagen headquarters of the Danish State Railways, briefly reviews the activities of the railway and its subsidiary undertakings, with some statistical reference to the years 1939-49. Mr. E. D. F. Terkelsen, General Manager, contributes the preface. The subjects covered include train ferries, electrification, and mechanical handling of freight. The excellent photographic illustrations will be of interest even to those who read no Danish.

Ransomes & Rapier Engineering Products.—Rapier News illustrates Ransomes & Rapier Limited mobile cranes in action handling cargo, including heavy container traffic, at various ports and at work in a shipbuilding yard; Rapier 8½-, 5- and 3-ton Super Mobile and 6-ton Standard mobile cranes are used in over 30 ports throughout the world. An illustrated brochure describes Rapier 5- and 7-ton tilting drum concrete mixers equipped with the Ransome Patent Drum and a special arrangement of lattice-type self-cleaning blades.

B.E.A.M.A.—Publication No. 141. Gratis from The British Electrical & Allied Manufacturers' Association, 36 and 38, Kingsway, London, W.C.2.—The historical sketch in this pamphlet outlines the rapid growth of the British Electrical & Allied Manufacturers' Association from its foundation (and taking over of an existing but less comprehensive body) in 1911, its overseas ramifications, and action taken to encourage development, research, and professional education, the setting up of the Electricity Commissioners, and the creation of the World Power Conference. Features of the organisation described are the wide range of manufacture covered by the 30 sections, and the degree of co-operation with allied, besides other electrical bodies. Today, under the chairmanship of Mr. H. W. Bosworth, of the Lancashire Dynamo & Crypto Limited, the B.E.A.M.A. Council consists of 34 member firms. Activities include the drawing up of fair conditions of sale, consultation with the B.E.A., standardisation, and the fostering of export trade. The Traffic Committee has done much in conjunction with the railways to ensure provision of special wagons for large or heavy consignments of electrical machinery.

Fitting and Maintenance of Roller Bearing Axleboxes.—An illustrated publication, Service Manual No. 1007, has been issued by British Timken, Aston, Birmingham, 7, which will be of considerable practical assistance to railway staff responsible for the maintenance of locomotives fitted with British Timken roller bearings. The manual contains an illustrated step-by-step description of the method of fitting, the lubrication and the maintenance of British Timken split type cannon box. The operations as detailed in the manual are similar to those required for all types of locomotive axles having inside journals.

Nickel Alloy Spring Materials.—This booklet by Henry Wiggin & Co. Ltd., Wiggin Street, Birmingham, 16, contains considerable detail regarding the properties and characteristics of high-nickel spring material manufactured by the firm. Also included in the publication are design formulæ of the various types of springs and the heat treatment necessary, and the characteristics of Monel, "K" Monel and other nickel alloys. The publication is free on application to the firm.

Electric Locomotives of British Railways

Five groups of machines in service, all of the power bogie type with total adhesion

MR. W. J. A. SYKES, Assistant Electrical Engineer, Southern Region, British Railways, presented a paper on electric locomotive practice in Great Britain to the fifth session of the I.E.E. Convention on Electric Traction last month. There were five main groups of these locomotives, all of the power-bogie type with total adhesion. Leading characteristics of all groups were tabulated. Brief reference was made in the paper to the North Eastern Region Bo-Bo shunters, built in 1905 for the Tyneside lines, and to the Bo-Bo Metropolitan Line locomotives of London Transport, which in due course would be replaced by multiple-unit working.

Manchester-Sheffield Service

Discussing first the 1,500-V. d.c. Bo + Bo locomotive built for the forthcoming Manchester-Sheffield-Wath electrification Mr. Sykes gave some details of performance with this machine while on loan to the Netherlands Railways. Goods trains of up to 1,750 tons trailing had been worked without difficulty. Such a load had been started at the foot of a 1 in 125 up-gradient—the train being on the level and the locomotive on the gradient—and a speed of 11 m.p.h. was attained. During this start 7 min. were spent on the resistance steps without producing any signs of distress in the equipment. The normal notching current was 700 amp.

Satisfactory results were given by the anti-slip device, which reduced the tractive effort of motors 1 and 3 in the direction of travel by weakening their fields. At the same time the tractive effort of motors 2 and 4 was increased by notching at a higher current.

In passenger service the locomotive worked 12-coach passenger trains of 400-600 tons over the 140 miles between Amsterdam and Maastricht. Details were given of a test run with a 390-ton train from Heerlen to Amsterdam, when the actual running time (excluding stops) for the 132·7 miles was 159½ min., an average of 49·9 m.p.h. The 22 miles from Utrecht to Amsterdam were run in 21 min., or 62·9 m.p.h. average. Various modifications to the locomotive equipment to meet operating conditions in Holland were described, among them being an alteration to the master-controllers to provide weak-field running on the series notches. This gave a balancing speed of 45-50 m.p.h. with a 300- to 400-ton train, and seemed particularly suited to the local service requirements.

L.T. Departmental Locomotives

The next group dealt with consisted of the nine London Transport Bo-Bo departmental locomotives, which were designed primarily for track maintenance duties and therefore were equipped with batteries which enabled them to be independent of an external supply. Six of them had resistance control and three metadyne control. Those with resistance control had been found by experience to be better suited to the duties required, and a further seven similar locomotives were under construction. Two locomotives could be operated in multiple with a trailing load of 200-250 tons, and the balancing speeds on level track with 250 tons were: battery operation, 15 m.p.h. minimum; on 600 line volts, 30 m.p.h.

S.R. Mixed-Traffic Design

As the final group considered, Mr. Sykes took the three Southern Region Co + Co mixed traffic locomotives. These had been described in detail in the technical press, and reference was made in the paper to an article in *The Railway Gazette* of March 25, 1949. Likelihood of stalling on conductor rail gaps was only one of the considerations affecting the choice of motor-generator control with flywheel energy conservation.

Another factor, borne out in practice, was snatching and surging in goods trains caused by sudden removal of tractive effort when the collector shoes entered a gap. A floating battery had been considered, but this would have been bulky and heavy, due to current demands of 3,000 amp. and over at high tractive efforts. The system adopted had proved completely successful in practice; acceleration by generator field control, moreover, was favourably regarded by the distribution section, due to the absence of high current peaks.

Eliminating Flashover

Isolated cases of flashover at the booster motor commutators had been experienced with the first locomotive in 1941. They were found to coincide with short-circuits on the conductor rail in the vicinity of the locomotive, which short-circuits were applied also to the booster motors. In these circumstances the rate of current rise at the brushes was of the order of 10^6 amp./sec., necessitating opening of the line breaker in some 0·0035 sec. if the machinery was to be protected. A complete solution had been found by fitting Branchu-type current limiters in each booster motor circuit. These operated entirely on rate of current rise, and had been shown by oscillograph tests to attain a speed of 0·0023 sec. in the case of heavy short circuits.

After nearly five years of running a series of severe traction motor flashovers was experienced on the first two locomotives. These appeared to occur if there was a nearby track short-circuit while running at 30 m.p.h. or so after returning the controller to one of the early notches (in which booster output opposed line voltage). Protection against the reverse current that would flow if the ordinary overload protection relay (set at about 1,500 amp.) did not trip had been provided by substituting a double-coil differential relay. This operated if there was a difference in current between the entering and leaving ends of the circuit. Absence of this trouble in earlier days might have been due to drivers alternating between full power and coasting, whereas with increasing experience they used the control system to proportion the tractive effort accurately to the load.

For locomotives operating in the higher speed ranges something more stable was desirable than the conventional motor coach type bogie with central pivot. In the N.E. Bo + Bo locomotive already mentioned no tractive forces were transmitted through the body, the drawgear being mounted on the bogies, which were connected by an articulated coupling. The central pivots in the bogies served merely as points of rotation, the body weight being carried on four bearing points on each of the bogies.

Two segmental bearings at the ends of the longitudinal diameter of a 9-ft. circle were used for each 3-axle bogie in the Southern Region locomotives. It was impossible for the bogies to tilt in relation to the underframe even at very high tractive efforts. Under such conditions, both bogies and underframe tilted slightly as one unit, but the degree of weight transfer was such that little trouble had been experienced with wheel slip even when accelerating the heaviest loads.

The large area of the segmental bearings had a considerable damping effect on hunting. Combined with moderate spring side control and the long bogie wheelbase, the segmental bearings had eliminated hunting almost completely even at the highest speeds. A frictional damping coupling to reduce hunting had been provided between bogies in the first locomotive, but had been found unnecessary and was removed.

New Designs

Much had been learned, and the way was open for further progress. New designs for high-speed and mixed traffic locomotives were in hand for the Southern Region. These were for high-speed main-line locomotives with booster control, and for mixed traffic locomotives with a diesel auxiliary for operation away from the conductor rail.

Resilient motor-suspension systems of improved types were being investigated, the comfort of the driving staff was being studied in cab layout and amenities, and the effect of electric vehicles in general on the track at the higher speeds was the subject of special attention.

Lightning Protection on the South African Electrified Railways

Prevalence of electrical storms necessitates special equipment on rolling stock and overhead lines, and in substations

IN his paper, Mr. W. L. King, Assistant Chief Electrical Engineer, (Maintenance), South African Railways, explained that due to the geographical formation and climatic characteristics of South Africa, two of the three areas in which 3,000-volt electrification exists are subject to lightning storms of excessive frequency and violence. At Germiston, in the Reef electrification area, the index point for such storms, an average of 78 a season has occurred in the last six years.

Experience has shown that the majority of breakdowns in the traction system are due to induced surges in the overhead track-equipment: such surges may be induced by lightning discharges occurring within half a mile of the line. Very severe surges induced by "near misses" will go to earth over the nearest overhead equipment insulator, but less severe surges may affect a locomotive, motor coach or substation up to about ¼-mile away.

Electric Locomotives

The first lightning protection equipment consisted of two horngaps in series, with an earthed centre section and blowout coils. This was found to be inadequate to cope with surges. The arc problem, caused by distant substations continuing to feed currents less than their tripping settings, although the adjacent substations had tripped, was solved by altering the feeding

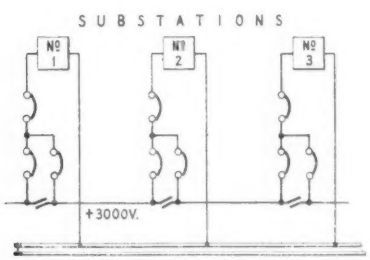


Fig. 1—Modified substation feeder arrangement

arrangements as shown in Fig. 1. The horn gaps of the locomotive arresters rarely broke the arcs caused by the d.c. follow-current, and high speed circuit breakers either side of each substation feeding point were necessary.

Surges caused many motor insulation breakdowns, and all 204 locomotives have surge absorbers now. The absorbers, besides acting as choke coils also have a capacitance between winding and earth, and the metal cases, acting as short-circuited secondaries, materially reduce surge magnitude, although locomotive equipment can still be subjected to peaks of over 7,000 volts. As such a voltage is in excess of the desirable maximum (twice the d.c. operating voltage), the main motor armatures are protected by a spark gap to earth, shown in Fig. 2, which limits the surge voltage reaching the main motor and motor generator set armatures.

The spark gap is designed to spark over at voltages above 6,500 volts, but not to operate under any normal working condition, up to 3,600 volts in regeneration. An adjustable gap having long arc horns, a four and a half turn

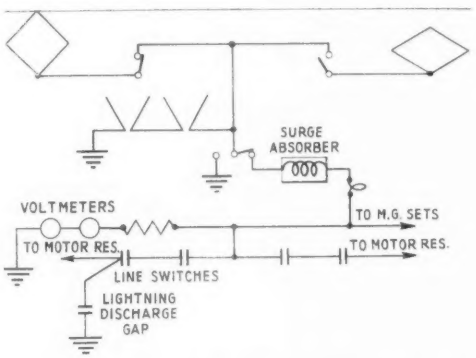


Fig. 2—Electric locomotive lightning protection diagram

blow out coil with iron pole pieces and an arc chute of line switch type is used. A compromise gap setting of 0·11 in. covers prevailing climatic conditions. The gap is not designed to break the power arc; this is the function of the substation breakers. Tests on capacitor and electrolytic arresters for locomotives showed them to be unsatisfactory

Motor Coaches

The lightning protection provided in each motor-coach consists of a 12-cell aluminium-plate electrolytic arrester rated at 3,800 volts d.c. and protected by an expulsion fuse. The arrester is connected through an isolating link direct to the pantograph busbar and is housed in the body of the coach. All cells are connected in series and a resistance-shunted series isolating-gap is provided.

The electrolytic arresters gave satisfactory results, and the incidence of lightning failures remained low until 1945-46, when a marked increase was experienced due to difficulties of maintenance and supply, and deterioration of material quality during the war. Lately there has been an improvement.

Capacitor arresters of 4-uF capacitance designed for operation at 2,000-3,900 volts d.c. have been used with success on a number of Reef motor-coaches recently, but an extended trial is desirable.

Overhead Track Equipment

Three factors requiring special consideration on lines of this type and voltage are: (1) The destructive effect of the high voltage d.c. arc which follows the flashover; (2) the necessity for maintaining steelwork moderately well insulated from earth to avoid electrolysis; and (3) comparatively low level of line insulation.

The early overhead installations were not very satisfactory; horn type spark gaps were unreliable in clearing faults, electrolytic arresters were adversely affected by heat, and capacitors of 8 mfd. proved unsatisfactory to protect low inductance equipment.

The standard arrangement now in use consists of two 6-in. bell type suspension insulators in series at each supporting point. With these insulators, which spark over in combination on 90 kV. (dry) or 54 kV. (wet) on 50 cycles a.c., and at 202 kV. on impulse, lighting failures have been almost eliminated.

Both motor generators and mercury arc rectifiers are in use. For the former, electrolytic arresters have proved satisfactory mounted in the substations under ideal conditions and with regular maintenance.

Thyrite arresters have not given such good results as indoor mounted electrolytic arresters, but temperature, and ripple in the d.c. have negligible effect on them, and they are robust. They have a high flashover voltage compared to their cut-out voltage, which is a disadvantage when the cut-out voltage has to be set high, for example 3,600 volts. Capacitor-type arresters have given promising results in the Reef area for substation protection.

Conclusions

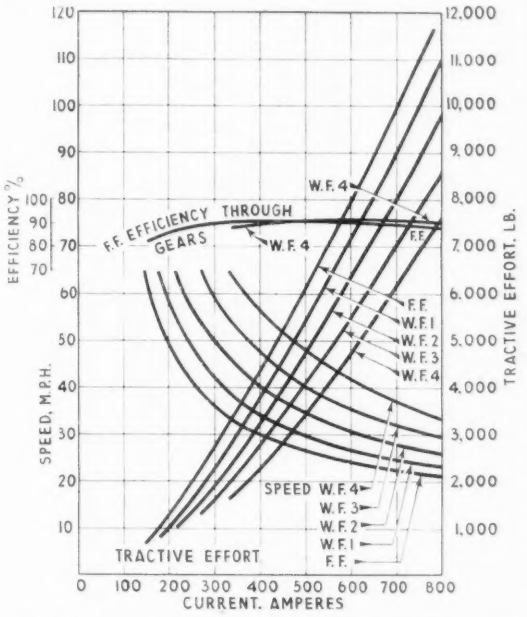
For the protection of electric locomotives, a robust type of equipment not affected by temperature or vibration is essential. The equipment should not require to be protected by a fuse, and the presence of high-frequency ripple in the d.c. supply should not affect its reliability. The inductive type of surge-absorber with horn gaps ahead to by-pass severe discharges, and protective gaps on the

(Continued on page 458)

Modern Traction Motors and Gearing

Modern trends of design in ventilation, stability, brushes and armatures, and use of roller bearings

IN their paper presented to the seventh session of the Electric Traction Convention, Mr. G. H. Fletcher and Mr. E. A. Binney outlined some modern trends of design. In view of the similarity in outward appearance between traction motors of the present day and of 30 years ago, it was clear, they said, that the factors causing improvement in design were mainly matters of detail. Designers had worked independently but along similar lines and within the same limitations, imposed by available clearance above and below the motor, usually of the order of 6 in. and 5½ in. respectively; by gauge width which limited the motor width to 5½ in. on standard gauge; by gear and pinion dimensions aimed at giving the highest possible gear ratio compatible with safe peripheral armature speed; and by minimisation of motor weight.



Performance curves of motor of locomotive used on Manchester-Sheffield line (at 700 volts).

Ventilation and Bearings

Improved ventilation had contributed much to the great reduction in weight achieved, especially in motor coach motors. To enable machines to be ventilated without picking up brake dust and other foreign matter from the track in the ventilating air, the system of "coach-ventilation" had been devised," in which the motor fan drew air through an inlet in the motor frame which was connected by a flexible bellows to an air duct leading to an opening in the coach wall. The air ducting which had been used in locomotives in conjunction with forced-draught blowers for some years, limited the air flow to the motors; this disadvantage, however, was amply compensated by the absence of brake dust in the motors.

Roller bearings were now universally accepted for armatures; the type with a flanged outer race in which rollers and the cage were housed was most frequently applied. The main development was the provision of sealing arrangements to prevent grease entering vulnerable parts of the motors from over-greased bearings. An earthing brush of copper graphite on the axle protected bearings against the passage of current. In normal working conditions and maintenance the life of a roller type armature bearing was 500,000 to 1,000,000 miles.

Suspension bearings of the split-sleeve type, lined with white metal and fitted with large axle-cap oil-wells had in some cases operated on motor coach duties for 300,000 miles. The weight af the axle caps had been reduced by about 40 per cent. by fabricating. Roller suspension bearings gave the advantages of extended lubrication periods and better gear performance due to the reduction in radial wear as compared with sleeve bearings, but they were more expensive.

In insulation the aim had been to minimise the use of any material likely to be carbonised or otherwise detrimentally affected by heat. To this end glass tape, cloth, and sleeving were used, combined with suitable high-temperature varnishes on armatures and field coils. In the construction of field coils, alternative processes were widely used to ensure adequate insulation.

The use of four-brush arms on four-pole motors was very general. It allowed for lighter brush pressures, since any shock tending to lift one brush had the opposite effect on the opposite brush, and it reduced commutator length.

Use of felted-asbestos coverings for conductors and the development of synthetic varnish coverings had helped to reduce the cost of split conductors to lessen the eddy currents in heavy armature conductors, a difficulty characteristic of railway motor armatures with one turn per commutator bar. Increased peripheral speeds and smaller armature diameters had involved increased core bands and core band losses, so the tendency now was to use bakelised-fabric slot wedges.

It was often possible, as in the Manchester-Sheffield electrification, to provide a dual-purpose locomotive by using field weakening to give several economic running speeds.

The 1,400-V. Manchester-Sheffield locomotive had four traction motors operating in series parallel connection at 700 V. per motor, and giving characteristics shown in the diagram on this page. Considering a tractive effort of 2,000 lb. per motor, this would be obtained under full field conditions at a current of 250 amps. and a speed of 41 m.p.h. By the use of four stages of field weakening, WF_1-WF_4, it was possible to obtain the same tractive effort over an economic speed range from 44 m.p.h. to 60 m.p.h.

Gears

The tendency to use high-speed traction motors had led to a general tightening up of standards for gears, and a new B.E.S.A. specification was in course of preparation. There were three rough categories of railway gears: (*a*) carbon or alloy steels case hardened to 600 Brinell and with ground teeth; (*b*) 0·4-0·5 carbon steel water quenched to 450 Brinell with ground or unground teeth; and (*c*) pre-hardened alloy steel.

Of the three categories, case hardened gears were preferable despite their higher cost by reason of their greater hardness and reduced wear, of the reduction in tooth impact stresses, torque fluctuations and vibration, and of the quietness and higher efficiency of the gears.

Resilient gear wheels, incorporating rubber bushings, were used to ease the shocks of traction service both on gear teeth and on shaft and armature structure. They represented an advance on gearwheels incorporating steel springs, the reliability of which was not so high, rubbing surfaces were very lightly loaded and the vibration was damped. No trouble was experienced with suitable rubber from the effects of gear lubricant. An investigation into impacts from the track received by unresilient drives, resilient gear wheel drives and quill or equivalent drives, showed that for static axle loadings of unity in each case the impacts were 3·29, 2·78 and 2·31 respectively. In view of the saving in cost with axle hung motors as compared with quill-drive arrangements, the use of the former with resilient gears was a most satisfactory compromise.

Electro-Pneumatic Brakes

Stages in development to meet the needs of higher speeds and shorter headway

MR. H. R. BROADBENT, Traction Engineer, Chief Mechanical Engineer's (Railways) Department, London Transport Executive, in his paper on electro-pneumatic brakes, said that an equipment fully able to meet the needs of train braking should have the following characteristics:—

(*a*) Simplicity and convenience in manipulation.
(*b*) Integrity.
(*c*) Reliability.
(*d*) Simultaneous operation.
(*e*) Constancy in rates of braking.
(*f*) High rates of braking.
(*g*) Graduated applications.
(*h*) Unlimited applications.
(*i*) Graduated release.
(*j*) Compensation for passenger loading.
(*k*) Invariance in all weathers.
(*l*) Immunity from track variants.

The degree to which an equipment falls short of perfection under these headings was a measure of its weakness, although each weakness will vary in importance with different conditions.

The development, from the middle of the nineteenth century, of air-operated brakes, was directed towards overcoming the three main weaknesses: lack of graduated release; successive rather than simultaneous operation; and limitation in the sequence of operation. The introduction of the quick-acting triple valve reduced the time of brake application from six to three seconds over a 50-car train, but this was still inadequate, and there was also the disadvantage that the auxiliary reservoir required recharging after each application.

First Electrical Applications

The first applications of electrical control were directed to the improvement of the pneumatic control. The first change from a purely pneumatic application came with the provision of an electrically-operated holding valve enabling the driver to retain his brake while recharging the auxiliary reservoir, and to graduate his release. This was followed by the addition of an electrically-operated application valve, controlling the air supply from the auxiliary reservoir to the brake cylinder. With this system it was intended to allow recharging of the auxiliary reservoir through the triple valve, but although this gave simultaneous operation throughout the train, it failed to maintain adequate auxiliary reservoir pressure.

A second modification using the same application valve drew the air supply from the main reservoir pipe through a reducing valve for electro-pneumatic operation and used the ordinary pneumatic control with a supply from the auxiliary reservoir as the principal brake; electro-pneumatic operation was used only when the auxiliary reservoir pressure was inadequate. Later the use of main reservoir air with electro-pneumatic control became the principal braking system, with pneumatic control as a second string, and this was adopted on the Metropolitan District Railway about 1918.

At this time various other electrically-operated valves were introduced for experimental purposes and gradually the advantages of a more elaborate electrical control were realised.

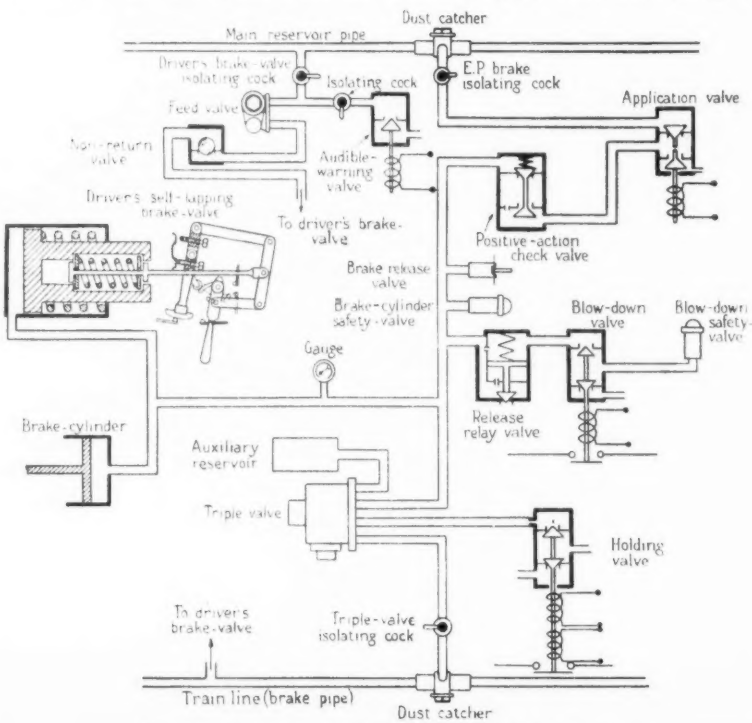
Recent Practice

When normal service braking or indeed the highest rates of emergency braking were concerned, electrical control had considerable advantages. It had been found possible by its use to fulfil conditions (*d*)—(*j*) in varying degrees in a satisfactory manner. They could be achieved in a practical way without undue complication, with an integrity based finally on the pneumatic emergency operation and with a reliability which could be assessed at one fault in 156,000 train stops.

Up to 1935/36 the system had developed but little from the relatively simple 1918 arrangement, using electrically-controlled application and holding valves to give simultaneous operation throughout the train, and graduated release. The main development was an interlock valve to warn the driver of faults in battery supply, application valve or holding valve. The principal shortcomings then were failure to cover variations in passenger loading and to provide high rates and constancy of braking. Developments to overcome these and to elaborate the system in other directions, were carried out by London Transport and embodied first in the 1938 tube stock and after the War, in the "R" stock. Diagrams showing the braking system for "R" stock are shown in the accompanying diagrams.

The apparatus for compensating for variations in passenger loading was known as the retardation controller. It consisted of two mercury switches governing two contactors in the application valve circuit and an added blow-down valve circuit respectively. Mercury in a circular glass tube moved forward as retardation commenced and completed a circuit after it had travelled through a predeterminted arc. The angle of the arc for the blow-down control was decided by the maximum rate of braking, possible under emergency conditions—a rate dependent upon available adhesion. If this rate was exceeded sufficient air was released from the brake cylinders through the blow-down valves to reduce it to the appropriate value.

The minimum value to which the pressure could fall was controlled by a safety valve and was decided by available adhesion for an empty train. The second mercury switch controlled the application valves, cutting off their electrical supply while still maintaining



Air schematic for London Transport "R" stock

the feed to the holding valves. The angle of arc for the second switch was set lower than for the first to avoid hunting.

Typical values for the angle of arc were 7° for the application setting and 8½ for the blow-down, equivalent to rates of braking of 2·8 m.p.h./sec. and 3·3 m.p.h./sec. respectively giving an average rate of braking of about 3 m.p.h./sec. with full service electro-pneumatic brake and cast-iron brake blocks. With non-metallic brake blocks the lower adhesion required a lowering of the above settings by ¼° each. Other methods had been used to compensate for variations in the coefficient of friction of brake blocks by reducing pressures at a predetermined speed and to compensate for passenger loading by weight compensating devices.

The above method dealt with both variants, but took only the average train weight into account. In deciding on braking rates allowance had to be made for variations in individual car loadings. If the blow-down setting was 3·3 m.p.h./sec. the emergency braking might reach 3·5 m.p.h./sec. due to the rapid rise in the coefficient of friction of the blocks.

Driver's Self-lapping Brake Valve

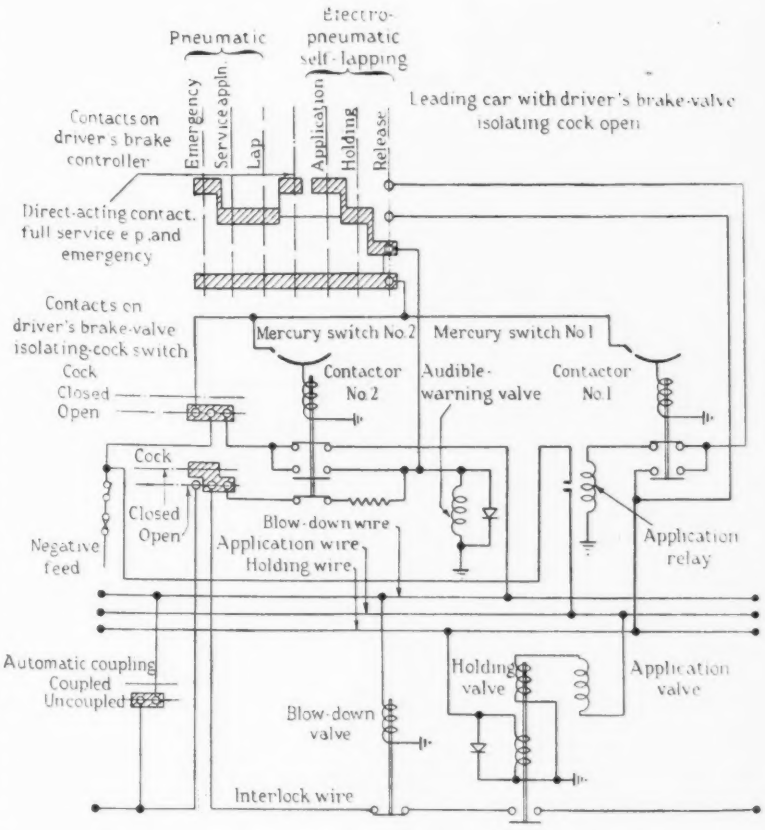
This mechanism functioned by balancing the air pressure in the brake cylinder of the leading car against a spring. The driver moved his handle through an arc and made first a contact feeding the holding valve supply wire and second the application valve supply wire. Further movement of the handle compressed the smaller spring in the mechanism. Compressed air at brake cylinder pressure was applied to move the piston in the mechanism against a second spring, relieving pressure on the first spring and then applying it again to the opposite end causing the arm carrying the electrical contacts to move and break the application contacts while leaving the holding valve contacts closed until the driver wishes to release. By moving through different arcs the springs were compressed to different degrees maintaining different brake cylinder pressures. A direct acting contact was fitted to provide an emergency electro-pneumatic action, but apart from the use of contacts to interrupt the circuits, the self-lapping system is purely a pneumatic brake system.

Experience had shown that the best means of supplying the electric current for the brake control circuit was a combination of low voltage motor-generator set and battery. On London Transport systems the voltage was 50 volts, and a 23-cell lead acid battery was used. The accompanying table gave a synopsis of present practice in this country for current and air supplies.

A combined regenerative and electro-pneumatic brake had been tried where only a proportion of axles were motor-driven: by this means full advantage could still be taken of the available adhesive weight. To provide air on trailing axles when regeneration occurred on driven axles and to cut out regeneration when there is insufficient acceptable load separate brake cylinders were provided for driven and trailing axles, with two electrically-controlled regenerative valves. According to the amount of regeneration, both, one, or neither valve was energised, regulating the flow of air from the main reservoir pipe to the motor cylinder until pressure in motor and trailer cylinders was equalised.

To provide for a range of braking from empty to full train it was necessary with retardation control to provide a pressure of 50 lb. per sq. in. at the electro-pneumatic feed valve in relation to 33/34 lb. per sq. in. brake cylinder pressure with an empty train during continuous venting through the blow-down valve. The figure of 50 lb. per sq. in. also provided for variations in coefficient of friction. Where speeds are high it might not be possible to achieve the full benefits of retardation control since the range of pressure required to maintain the same braking rate from 100 m.p.h. with a loaded train to 5 m.p.h. with an empty train would be of the order of 4 to 1, making design difficult.

Future development might be in the use of electro-vacuum brakes, or with electro-pneumatic retardation control superimposed on the Westinghouse automatic brake, tried on the Paris Metro. By weighing operating requirements against simplicity a balance was finally achieved.



Electrical schematic for London Transport "R" stock

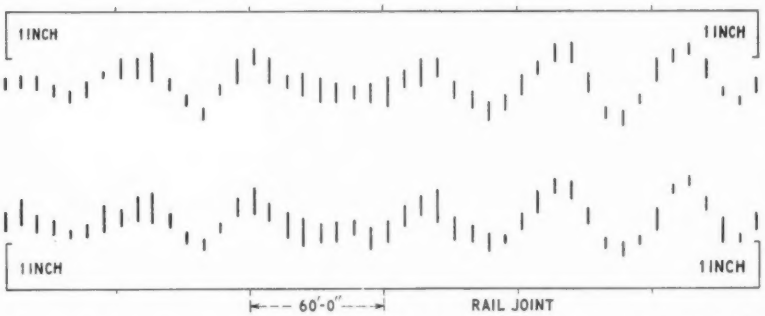
TYPICAL ELECTRIC AND PNEUMATIC SUPPLIES FOR ELECTRO-PNEUMATIC BRAKES

Section	Eastern Region, Liverpool Street—Shenfield Line	London Midland Region, Wirral Line	London Transport Executive, Northern Line
(a) Supply voltage	50	52	50
(b) Source	1 500 50-volt motor-generator with nickel iron battery	Nickel-iron battery charged from 650-volt main traction supply	650 50-volt motor-generator with lead-acid battery
(c) Brake-block material :			
Motor-driven wheels	Cast-iron	Non-metallic	Non-metallic
Trailing wheels	Cast-iron	Non-metallic	Non-metallic
(d) Air-pressure settings, lb. sq. in. :			
Main reservoir pipe	85 100	85 100	75 90
Brake pipe	70	65	65
Electro-pneumatic feed	55	35	50
Cylinder safety valve	57	42	55
Blow-down safety valve	—	—	31

The Effect of Electric Traction on the Track

More frequent services of uniformly-marshalled electric trains causes track wear of characteristic forms, but no more severe than with steam, service for service

DR. F. C. JOHANSEN, lately Deputy Scientific Research Manager, London Midland Region, British Railways, presented at the third session of the Convention a paper which reviewed the investigations made on track used intensively by electric rolling stock. The effects of electric traction were of growing importance in view of the trend towards railway electrification and the significance of track costs in the economics of rail transport. The interaction between track and rolling stock was so intimate that imperfections in either reacted adversely on the other so that damage to track by electric trains had repercussions not only on passenger comfort and vehicle maintenance, but also on the rate at which both track and vehicles deteriorated.



Periodical side-cutting of rails. Limits for five runs at 24-51 *m.p.h. with* 1/20 *coning of the treads*

Track

The track used for electric trains had essentially the same size and form as that used for steam trains; flat-bottom rails had been tried but are not yet widespread and a few pre-stressed concrete sleepers were under trial. The latter had the disadvantage that when wet their insulation resistance became so low as to cause unsatisfactory operation of signalling track circuits and risk of traction current leakage. There was no evidence that traction current leakages cause electrolytic corrosion of track components.

Conductor rails were subject to gradual longitudinal creep in a direction differing with locality, circumstances and gradient. The causes were obscure, but the effect could be counteracted by anchoring each stretch of conductor rail to several neighbouring sleepers.

Conductor rails were also a hindrance to track maintenance due to their position relative to the running rail, and the dangerously high voltage. Overhead conductors also prevented the use of high jib cranes for mechanical track-laying and breakdown work.

The principal effects of electric traction on the track were similar to those of steam, but differed markedly in degree. Some effects were so much more severe than on steam track as significantly to enhance maintenance and renewal costs; these were evidently due to: (*a*) design features characteristic of electric stock, particularly as regards the driving bogies of multiple-unit trains; (*b*) the manner in which trains are operated; or (*c*) some combination of (*a*) and (*b*).

Under (*a*) were included such mechanical similarities between cars as size, wheel diameter and wheel spacing; even distribution of driving wheels on pivoted bogies throughout the train; and driving bogies of large mass with low centres of gravity and much unsprung weight. Combined with a large number of small disc driving wheels of high rigidity, all these agencies tended to accentuate vertical and transverse forces of wheels on rails.

Under (*b*)—train operation—the outstanding characteristics of electric traction were the regularity, similarity and intensity of traffic resulting in the majority of trains travelling at about the same speed and under the same conditions at any point on the track. Thus the random effects of steam traction became localised and accentuated by electric traction.

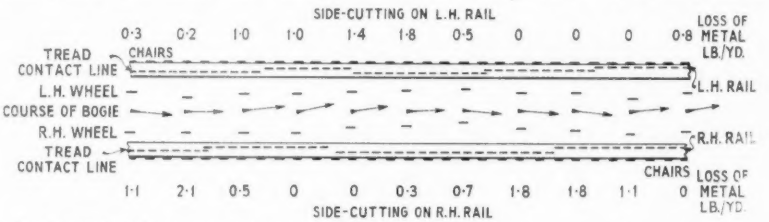
Lateral forces due to motor bogies caused, among other things, displacement of the track and loosening of chair fastenings, the resulting looseness and movement of rails and chairs aggravating lateral wheel impacts. Although the driving wheels of multiple-unit trains caused more severe chair reactions than did other wheels, the track deterioration was more certainly due to the greater frequency of electric trains than to nose-suspended motors. There was little evidence to show that train marshalling had any influence on track wear.

Apart from considerations of mass and loading, electric motor bogie wheels tended to cause higher impacts than steam locomotive driving wheels because they were of smaller diameter and partly also because vertical movement of the driving wheel adjacent to the gear drive was resisted by the gearing. At a given speed of travel the vertical acceleration when the wheel rode over a prominence or fell into a depression was greater with the smaller driving wheels of electric stock than with a steam locomotive. Thus changes in level at rail joints led to severe impacts at running-on ends, often forcing the sleepers at that point down beyond the elastic recovery of the ballast so that eventually a cavity was created, filled with mud, which impaired drainage and set up rotting of the sleepers.

Investigations on wheel impact in connection with concrete sleepers had shown that the normal value of chair reaction was slightly higher for wood sleepers than for concrete, but tended, for both types, to be higher for electric than for steam trains.

Rail Deformation

The frequency of trains which electrification allowed, together with small diameter driving wheels, accentuated the battering of rails which occurred with all trains. At the running-on end of interruptions in level the rail top was often battered down and spread transversely, while the arris at each rail end was deformed, reducing the expansion gap. Corresponding with batter of the head was "galling" of the foot of the rail where it rested on the hard cast-iron chair.



Periodical side-cutting of rails. Running of a leading motor bogie coasting over badly side-cut track

Another form of wear was that associated with switches where the stock rail was joggled to form a recess in which the thickness of the switch tongue could fit. Electric traffic along the through road

(*Continued on page* 461)

The First Two Years of British Railways—1

Problems and progress in 1948 *and* 1949

By Sir Eustace Missenden, O.B.E.,
Chairman, The Railway Executive

MORE than two years have now elapsed since the Railway Executive assumed, on January 1, 1948, the responsibilities delegated to it, and the Editor of *The Railway Gazette* has accordingly asked me to make a broad survey of the problems and achievements during this period.

At the outset, it may be well to recall that the Transport Act, 1947, initiated far-reaching changes in the structure and organisation not only of the railways but of all forms of the public inland transport services in Great Britain. The Act provided for the transfer of many undertakings to public ownership and control through the establishment of a specially constituted public authority, the British Transport Commission, which is charged with the provision, on a self-supporting basis, of an efficient, adequate, economical, and properly-integrated system of public inland transport and port facilities.

The Commission is essentially a small policy-making body for the undertaking as a whole, which does not deal with the day-to-day administrative and executive work. The Act, recognising the vastness of the Commission's undertaking and the magnitude of the administrative problems involved, empowered the Commission to delegate responsibility for the administration, operation, and maintenance of its various branches to a series of separate statutory bodies, known as Executives, of which there are now six, one of which is the Railway Executive.

It is important to note that nationalisation has not meant the direct control and operation of the transport services by a Government department, in the sense of the Post Office or Admiralty. The policy of Parliament was summed up by the Lord President of the Council, in the House of Commons, in March, 1948:—

> "If we run these public corporations—highly commercial, highly industrial, highly economic—on the basis of meticulous accountability to political channels, we are going to ruin the commercial enterprise and the adventurous spirit of these public corporations in their work."

Referring to the men in the service of these Boards, he went on to say:—

> "If these men are to live a life which is really a Civil Service life, and are liable to be abused across the Floor of the House and subjected to Questions attacking them and their commercial ability, we shall not get the men to serve on these commercial undertakings, and we shall not get the best out of those who are there."

I can say that during the two years of the Railway Executive's existence this policy has been adhered to.

The Executives are essentially management bodies, whose first task has been to assimilate and reorganise the undertakings they have acquired. The Railway Executive consists of seven full-time and two part-time Members. In general, each Member is responsible for the direction of a group of departments, while the Executive also meets and functions as a corporate body, assisted by the part-time Members who contribute to the discussion their knowledge of industry and agriculture.

Sir Eustace Missenden

The actual administrative organisation of British Railways was not laid down in the Act, but has been evolved during joint consultations between the British Transport Commission and the Railway Executive. In determining the organisation, weight had to be given to two important and closely-related considerations. These were the need to avoid both the creation of an over-centralised organisation, with the inevitable evils of bureaucracy, and the making of unduly drastic changes, since the sudden disruption of well-tried organisations and established practices might easily have led to serious working difficulties, with resultant congestion and delays to traffic.

Railway Executive Organisation

But the very creation of a unified railway system involved the establishment of some central headquarters organisation. This was essential in order to bring about unification of policy and direction, and to enable us to allocate the limited resources and materials at our disposal to the best advantage for the undertaking and the country as a whole. Centralised direction was also necessary to enable a start to be made on the programmes of unification and standardisation of equipment.

It was decided, as a cardinal principle, that there should be a central headquarters at the Railway Executive, with responsibility in connection with the general direction of the undertaking, and that day-to-day administration, maintenance, and operation of the railway system should be carried out in six Regions.

An essential feature of the organisation of the Railway Executive is that the Headquarters determine major matters and unified standards, and ensure that these are adhered to. Each Region is an entity in itself, which operates in conformity with a common policy and standards, using locomotives and rolling stock allocated from a common pool. The aim is to keep all possible detailed work away from the Railway Executive and its staff to a minimum. We realise, as the late Earl Baldwin so aptly put it, "That too much attention to detail leads to pettiness." We aim at the advantages of centralised authority in matters of principle, with the advantages of decentralised administration. The problem is to divorce the two ideas of authority at Executive Headquarters and of the administration of that authority by the Regions. Centralisation always enhances the importance of paper work, which really dims reality and can be a menace to the administration of an undertaking of the character of a railway.

The six Regions, which differ considerably in size and in the character of the operating conditions and the traffic conveyed, were largely an obvious choice. They were, in fact, already in effective existence as administrative or operating units, since they correspond very closely to the complete territories or administrative areas of the former main-line railway companies. Consideration was given to dividing the large London Midland Region in two, with a North-Western Region, with its headquarters in Manchester, and to establishing a Welsh Region, consistent with Welsh national sentiment. In both instances, however, the creation of a new Region would have cut right across existing

administrative and operating units, and traffic flows. In view of the absence of telephone circuits, so vital for railway working, of the lack of office accommodation, and of the problem of transferring and finding homes for the staff, such changes would have yielded few advantages, which would have been offset by the serious practical difficulties.

To avoid overlapping in those cases where two or more of the former railways served the same district or where one railway's system extended into the territory served primarily by another railway—as was common in the competitive era—certain lines are now being transferred between the individual Regions. We are seeking to place all railway activities in each town, insofar as the public are concerned, within the one Region and under the control of the same headquarters and officers.

Regional Organisation

Each Chief Regional Officer reports direct to the Railway Executive and is responsible for the general administration of the Region, in conformity with the policy and general instructions of the Railway Executive. Each Region is organised on a departmental basis. The Chief Regional Officer, in addition to exercising general oversight of the work of each departmental officer, is the co-ordinator and cross-tie between the departmental officers of the Region, so that they can work together as a team.

Each departmental officer communicates directly with, and takes instructions directly from, the appropriate functional Member of the Railway Executive in regard to specialised or technical matters concerning only the work of the department. Thus, while major matters of policy affecting the Region as a whole tend to be dealt with between the Railway Executive and the Region, through the Chief Regional Officer, specialised and technical matters are dealt with direct between the functional Members of the Executive and the appropriate departmental officers in the Regions.

This procedure has been designed to secure speed and efficiency and to avoid the necessity for a mass of highly-specialised or technical matters having to be passed through the intermediary of the Chief Regional Officers, who, in many cases, have no immediate interest in the subject. One feature of the organisation has been to determine, in practice, those matters which should be and which need not be, passed through the Chief Regional Officers. A flexible interpretation of the present system, in the light of practical experience, is providing the answer. Goodwill, common sense, compromise, and precedent, in accordance with British traditions, are proving more effective than any formal or rigid definition of procedure. In addition to frequent consultation, the Chief Regional Officers attend a meeting with Members of the Railway Executive every other week, which enables them to maintain contact and be in touch with the development of policy.

The need to bring about, as soon as possible, the unification of methods and equipment has meant that, in the first place, considerable authority has had to be vested in the Railway Executive Headquarters. The Executive alone can form a picture of the undertaking in its entirety, and institute the necessary investigations required to analyse the practices and equipment of the former individual companies and to determine those new unified standards which will best meet the requirements of the undertaking as a whole.

There is reason to expect that, as unification is achieved, as the new standard practices and equipment are adopted, and as the undertaking gets into its stride, a greater devolution of responsibility from the Railway Executive to the Regions in some spheres will be possible. We appreciate it is not decentralisation to have Regions, if all decisions have to be made at Headquarters and the officers in the Regions are merely intermediaries in passing them to lower levels to carry out.

Some of the more important developments in organisation have been in the field of staff relations; as may be recalled, one of the great arguments for nationalisation was the better opportunities it would afford for improved labour relations. We have had frequent discussions with the trade unions, and everything possible is being done both to inform the staff of the various changes contemplated and the motives underlying them. We are endeavouring to secure the whole-hearted co-operation of the staff in carrying through the changes, many of which are involving a big break with past practice. While retaining the full rights and responsibilities of management, we have instituted a sytem of joint consultation between management and staff at all levels.

Two Joint Advisory Councils, consisting of representatives of the Railway Executive and the trade unions, have been set up, namely, the Joint Advisory Council for Welfare, and the Joint Training & Education Advisory Council. The former will make recommendations on all questions affecting safety, health, and welfare of staff, such as, for example, canteens, washing and toilet facilities, heating, lighting, welfare work, social and recreational facilities, accident prevention, and first aid. The latter will advise on schemes for the education and training of staff of all grades and ranks.

The policy as a whole will, it is hoped, play a big part in enabling the individual to realise that he is a human being and that there is every opportunity for him to apply his skill and experience to the common purpose. We hope to find in this way sources of inspiration and imagination which must exist amongst such a large body of men and women, and which might otherwise go unheeded.

Aims of Organisation

In framing the new organisation our aim has thus been to enable the undertaking to discharge its responsibilities with the maximum of efficiency and at a minimum cost commensurate with the employment of a contented staff.

Although the public and traders enjoy certain statutory safeguards, we are conscious that our greatest asset in guiding and controlling the undertaking, should be a highly-developed sense of public responsibility and enterprise. It is our policy that our officers should be in constant touch with customers up and down the country, finding out what each requires, and either seeing that they get it, or, if this is not possible, explaining what is the next best thing that can be done.

Officers and staff alike must be inspired with the urge to produce, on a sound economic basis, a transport service of the quality and in the volume required, at a price the public and traders are willing and able to pay. It is to be expected that, in the course of years, there will be changes in public and trading requirements. A good administration must be dynamic and not static; it must be attuned to respond to the varying external circumstances. If necessary, the organisation must be adjusted so that the undertaking is in a better position to meet the changing demands upon it.

In railway work, as elsewhere, the application of modern techniques necessitates considerable specialisation, which threatens to imperil the common objective. We cannot be efficient until each of our experts in their diverse spheres of duty—either in the subject or the area with which he is concerned—has learned to blend his depth of knowledge with a breadth of vision of the common purpose. Efficient railroading, to use an American phrase, requires each man to assess his sphere of responsibility—technical or traffic—in relation to the common problems and common purpose of the whole undertaking.

There are certain exceptional features of railway work which are in marked contrast with so many branches of industry. There you have a large number of employees in one factory, engaged in similar processes and subject to the direct supervision and control of the management, which greatly simplifies both the problems of supervision and discipline, and the ability to create esprit de corps.

Very many railwaymen work in isolated positions or in small groups and are not subject to direct supervision as in the case of workers in factories; yet the safety and smooth working of the railway depends on these men and women, and the efficiency of our operation is the measure of their self-discipline.

The creditable safety record of the railways, especially last year, when not a single one of the 1,000 million passengers carried lost his life as the result of a train accident, bears witness to the very high standard we have been able to maintain, in spite of any deterioration in standards and the malaise resulting from the war years.

Much railway activity, for supervisors and workers alike, is, by its very nature, not attractive compared with standards in modern industry. The railways must give a 24-hour service, seven

day a week, year in and year out. Much of the work must be out of doors, regardless of the weather, or in unattractive surroundings. We cannot offer many of our staff a five-day week or many of the advantages of work in a modern factory, with all its amenities. We must, therefore, do everything in our power to develop, by voluntary methods, the traditional sense of loyalty and discipline of railwaymen, to see that they are inspired with a sense of purpose in their work and a sense of duty to the nation.

There is a grave danger in an undertaking so vast as British Railways of losing the human touch and of the individual feeling that he is a mere cog in a remotely-controlled machine. A man wants to feel he is an individual. A supervisor, stationmaster, foreman, or ganger wants to be able not only to express his own opinion freely but to know it is listened to and respected. It encourages him to know that he is an essential individual, doing a worthwhile job in an important undertaking.

There must be, in any large organisation, and particularly on a railway, a clearly-defined chain of command and definition of responsibilities. Yet provision must be made for the maximum personal contact between all levels, and to ensure the minimum of remote control with the fewest opportunities for deferring decision and the shelving of responsibility. Much railway work, by its very character, calls for flexibility, quickness of decision, and considerable individual initiative, and our training of men for higher posts seeks to bring out these attributes. There is, of course, a place for academic success and theoretical knowledge, but often in railway work —as indeed in other business activities —experience and intuition must determine a course of action, "For a man's mind is sometimes wont to tell him more than seven watchmen who are set above in a high tower."

British Railways, although nationalised, must pay regard to commercial principles. The permanent way, the stations, the locomotives, the wagons and coaches exist to meet the changing needs of the traders and the travelling public, and our organisation must be alive to meet every variation in trading practices and public habits. Gladstone in another connection once spoke of "men of slower pace, drier light and more tranquil and comprehensive judgment," but although such an attitude of mind may be sometimes useful in railway work, the aptitude to make a rapid assessment and a quick decision is probably of greater value.

For the success of an undertaking like British Railways, it is vital to ensure that all concerned are receptive to new ideas. It is a facet of management that demands the utmost vigilance, and one to which we are giving close attention. Previously, of course, competition in designs and methods existed between the separate railway companies, but this form of stimulation no longer exists. Something else must be found to replace it.

We compare our practices and performance with those of overseas railways. We encourage our staff freely to take part in the proceedings of the various Institutes, and we employ, as appropriate, the services of outside specialist consultants. We shall continue to keep under review modern trends of thought and discovery throughout the world and to seek ways of applying, for the benefit of British Railways and their users, the latest techniques and methods. Standardisation must be an instrument to achieve an efficient and economical service to the public. It must never become the tool of the lazy administrator.

In the two years, the foundations have been laid for the organisation and operation of British Railways as a unified system. Much of the groundwork in determining the rôle of the railways and dovetailing them into a properly-integrated system of inland transport is well advanced. Despite the financial and physical restrictions imposed on renewal and development programmes by the economic condition of the country, much solid progress has been achieved in restoring our equipment and services.

In the second part of this review I will attempt to survey some of the problems which have confronted us in restoring our equipment and services after the war years, the lines on which unification and developments are proceeding, and to indicate the progress so far achieved

(To be concluded)

"Daylight Limited" Express, New Zealand

Inaugural "Daylight Limited" leaving Auckland for Wellington, hauled by "J" Class oil-burning locomotive, New Zealand Government Railways

Photo] [W. W. Stewart

Doubling and Regrading in Gippsland, Victoria

To cater for industrial developments in a once wholly agricultural region, extensive improvements are being made to the main line

Double-headed goods train, with train engine running tender first, leaving Drouin for Warragul, Victorian Railways

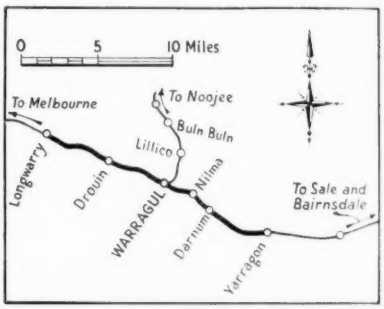
THE Eastern District Lines of the Victorian Railways serve Gippsland, an undulating dairy-farming district with high mountain pastures. Industry is spreading to some of the larger towns along the main single line from Melbourne to Bairnsdale, 170 miles long. Southern Gippsland is served by another line which turns south at Dandenong, the end of the suburban section. On the Bairnsdale line 85¼ miles from Melbourne there is a small station named Herne's Oak, whence a short single line spur, 2¼ miles long, runs north to Yallourn.

At Yallourn is situated the great open-cut brown coal mine, the source of the Melbourne electricity supply, serving also many country districts, as Gippsland, besides pastoral wealth, possesses valuable brown coal deposits. The State Electricity Commission of Victoria mines the open cut at Yallourn, generates most of the State electricity and operates the briquette-making plant, manufacturing briquettes from brown coal, in great demand as industrial and domestic fuel.

Some 20,000 tons a week of raw brown coal and briquettes are now hauled by rail from Yallourn to Melbourne in 500/1,000-ton trains. This traffic causes operating difficulties on a single track, in addition to passenger and general goods traffic, both of which are increasing, on the main Gippsland line. These difficulties are accentuated by a ruling gradient of 1 in 50 against up trains over an 18-mile stretch between Longwarry and Yarragon. Most heavy trains are double-headed on this section, and sometimes banked.

The planned expansion of output of raw brown coal and briquettes from Yallourn will create additional traffic. After leaving Yallourn for Melbourne the special trains pass on to the main line at Herne's Oak towards the eastern foot of the Haunted Hills. After passing through Moe they reach Yarragon, whence they are double-headed as far as Drouin by locomotives which work out from Warragul. The line from Drouin to Longwarry is steeply downhill.

The Victorian Parliament authorised doubling of the difficult 18-mile section from Longwarry to Yarragon, with extensive relocation and regrading to reduce the ruling gradient against up trains from 1 in 50 to 1 in 110. Two contracts were let for the preliminary earthworks, one for the section between Drouin and Nilma and the other for



Section between Longwarry and Yarragon, Victorian Railways, which is being doubled and regraded

Warragul Station, with brown coal train arriving from Yallourn behind "N" and "X" class locomotives

Passenger train approaching Drouin on existing single line. New up line used temporarily as siding on right

that between Nilma and Yarragon, and good progress has been made. Much earthwork has been necessary, both in regrading and realigning.

The contractors have not had to drive cuttings through hard rock, as most of the subsoil is thick clay or soft rock. Removal of this is largely by motor transport. Between Warragul and Drouin is the highest point on the line, over 500 ft. above sea level. A long cutting is ready and track laying almost complete; this cutting is crossed by two high overbridges, newly constructed, which conform to the practice of the Railway Department to replace timber bridges by steel and concrete bridges.

The working of the section between Warragul and Drouin is to be unusual for a country line in Victoria, with separation of up and down lines. A portion of the up track will be in cutting as a single line and the down track will be at a more or less regraded surface level, with the chief object of reducing the gradient against up trains.

Rails are welded in 225 ft. lengths at Newport Workshops near Melbourne, laid on five flat wagons coupled together, for haulage to the sites. While *en route*, these rails, when passing on to a siding during shunting movements or rounding a curve, bend with the movements of the wagons on which they rest. A flat truck has been fitted as a ballast plough, and ballasting is assisted by a mechanical ballast tamper.

Included in the programme is the reorganisation of Warragul station yard. Much subsoil from new cuttings has been used to form a long embankment to carry the realigned main line from the eastern side of the town. Warragul, 61 miles from Melbourne, is an important station on the main Gippsland line and is a terminus for some trains, with turntable, roundhouse, and so on. It is also a refreshment stop for through trains to and from Eastern Gippsland, and a branch line junction.

Normal passenger services on the main Gippsland line consist of two expresses daily each way which make only limited stops between Melbourne and Traralgon. A goods service only is provided beyond Bairnsdale. There are also two daily stopping trains to and from Traralgon and one to and from Warragul. Locomotives used on these trains are the standard passenger "A2" class 4-6-0 type.

Coal traffic is handled by any classes available. The most powerful goods engines on the Victorian Railways are the "X" and "C" classes of 2-8-2 and 2-8-0 wheel arrangement respectively. Next come two lighter classes of goods engines, the "K" and "N" of 2-8-0

View near Warragul showing: left, existing single line to be regraded down track; centre, new up track in partly-completed cutting

and 2-8-2 wheel arrangement. The "K" class was introduced in 1922-23 for mixed traffic on light lines and was the precursor of the "N" class which is similar in appearance, being a redesigned "K" of increased capacity.

Approximate maximum loads hauled by these locomotives over the heavy gradients would be: 1,025 tons to be hauled by two "X" or "C" class engines; 725 tons to be hauled by two "N" or "K" class engines; 550 tons to be hauled by two "A2" class engines. This particularly applies over the uphill climb between Warragul and Drouin. From Drouin onwards one engine usually suffices.

Experiments have recently been conducted by the Victorian Railways with pulverised brown coal as locomotive fuel. Locomotive No. 32 "X" class was fitted with necessary equipment and carried out tests on the Melbourne-Bendigo line. Some success is claimed. These tests are to continue on the Gippsland line on the special coal trains.

The work described is the largest constructional work undertaken by the Victorian Railways for many years and is the forerunner of developments further east at Yallourn and Morwell. A start has now been made with earthworks between Longwarry and Drouin, and work is proceeding steadily beyond Warragul, towards Yarragon.

Electric Vehicle for Parcels Delivery

A LIGHTWEIGHT electrically propelled vehicle, developed by Smiths Electric Vehicles, which firm is associated with Northern Coachbuilders Limited, Claremont Road, Newcastle-on-Tyne, is being used as an experiment for parcels delivery purposes by the London Midland Region of British Railways. The vehicle, which is stationed at Coventry, has a capacity of 330 cu. ft., and is fitted with an overload compartment immediately above the cab, while a sliding door behind the driver gives access to the parcels compartment. A roller-shutter door is at the rear.

The body, mounted on a standard one-ton chassis fitted with 27 in. × 6 in., low loading oversize tyres, is constructed of aluminium faced plywood and 18 S.W.G. aluminium sheeting, with the roof of boarded redwood covered with weatherproof cloth, the whole being reinforced with mild-steel gussets and angles. A chromium two-piece windscreen has been fitted and the front and rear mudguards are of Dunlop moulded rubber.

Electrically-propelled delivery van of 330 cu. ft. capacity in service in the London Midland Region

Lightning Protection on the South African Electrified Railways

(*Concluded from page* 448)

equipment side to limit the peak voltage applied to the locomotive equipment, have been found to be the most effective arrangement.

For motor coaches, electrolytic arresters mounted away from heat and vibration provide the best protection. A high standard of maintenance is essential to their satisfactory operation. Capacitor arresters can be recommended where conditions do not warrant the provision of electrolytic arresters.

Overhead track-equipment must rely on as high a level of insulation as possible, a dry sparkover of at least 30 times the working voltage being recommended. Each substation section of equipment must be protected by high-speed circuit-breakers at each end. Suspension-type insulators, two in series at each point, are recommended, and "dead ends" which may act as reflection points should be avoided as far as possible. Where conditions permit, an earth wire, or wires, should be run over the live equipment.

Substations are best protected on the d.c. side by electrolytic arresters mounted inside the substation on each outgoing feeder, and one arrester on the positive busbar. As with motor-coaches, the capacitor type of arrester can be recommended where lightning conditions are not severe.

SCANDINAVIAN TRAVEL AGENTS' VISIT TO BRITAIN.—The British Travel & Holidays Association, in co-operation with the Railway and Hotels Executives, Scandinavian shipping lines, local authorities, and the travel industry in the United Kingdom, arranged for a nine-day tour of Great Britain by 32 Danish, Norwegian, and Swedish travel agents, with a view to displaying the attractions of Britain in Spring and encouraging seasonal staggering of tourist traffic from Scandinavia. Starting on April 13, the agents are touring, England, Scotland, and Wales in four groups, with representatives of the three countries in each. Reference to a reciprocal holiday currency agreement between Britain and the Scandinavian countries was made in our February 24 issue.

B.T.C. BUS ADVERTISING IN THE EAST MIDLANDS.—From April 1, the commercial advertisement division of the British Transport Commission assumed direct control of the advertising space on the buses and trolleybuses operated by the Midland General Omnibus Co. Ltd., the Nottinghamshire & Derbyshire Traction Company, and the Mansfield District Traction Company. This group, which the B.T.C. took over from the British Electricity Authority, is now under the management of the Tilling Group Management Board. The vehicles operated in Nottinghamshire and South East Derbyshire total 309, bringing up to 17,599 the number of passenger road vehicles in England, Scotland, and Wales, on which advertising is controlled by the B.T.C. It is expected that the Commercial Advertisement Officer of the B.T.C. will take over the bus advertising of the companies owned in Lincolnshire, Thames Valley, Gloucestershire, Monmouthshire, and South Wales, in the near future.

RAILWAY NEWS SECTION

PERSONAL

Mr. W. H. Powell has retired from the board of the Westinghouse Brake & Signal Co. Ltd.

We regret to record the death, at the age of 69, of Dr. Fausto de Figueiredo, Chairman of the Portuguese Railways.

Mr. L. B. Norrish, who, on the nationalisation of railways in Uruguay, resigned his position as Chief Mechanical Engineer of the Central Uruguay Railway and associated lines, has joined the Self-Priming Pump & Engineering Co. Ltd.

Sir George Nelson, Chairman & Managing Director, and Mr. P. Horsfall and Brigadier-General Wade H. Hayes, Directors, of The English Electric Co. Ltd., sailed on April 16 in the *Queen Mary* for New York.

The late Sir Montague Eddy, C.B.E., who was for many years a prominent figure in the administration of the British-owned railways in Argentina, and a former Chairman of the Buenos Ayres Great Southern Railway Co. Ltd. and of the Buenos Ayres Western Railway Limited, left £13,037.

Mr. J. C. Groocock, Director & Chief Engineer of Sulzer Bros. (London) Ltd., is paying a visit to Australasia.

ENGINEER & RAILWAY STAFF CORPS

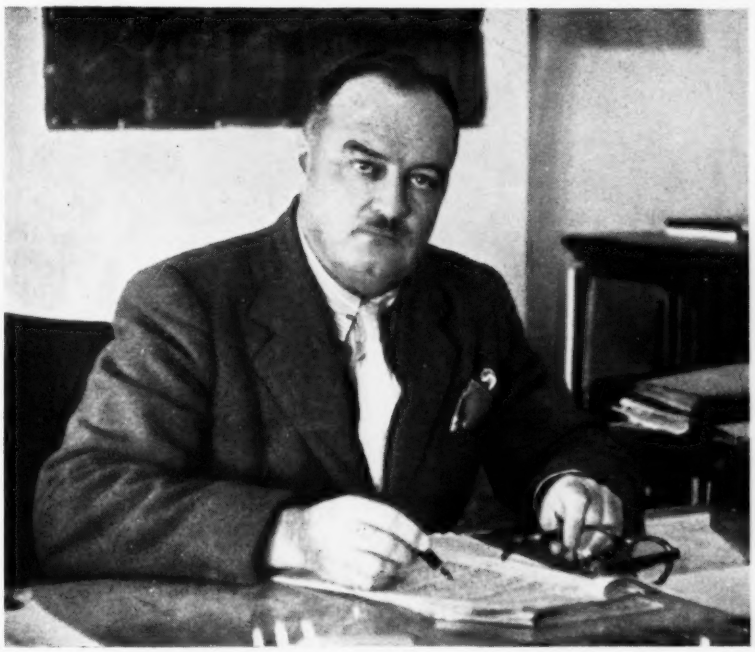
The following appointments were gazetted recently under the heading of Territorial Army—Royal Engineers: Engineer & Railway Staff Corps:—Major E. W. Rostern (late Reserve of Officers) to be Major, February 21, 1950; J. D. T. Firth, A. E. H. Brown and Oswald Hardie to be Majors, February 21, 1950.

Mr. Caquot (France), who has had a distinguished career as a civil engineer, has been elected President of the International Organisation for Standardisation, in succession to Mr. Howard Coonley (U.S.A.). Membership of the I.S.O. in confined to representatives of the national standards bodies throughout the world; the British Standards Institution represents the United Kingdom.

We regret to record the death on April 7, at the age of 75, of Mr. Walter Edward Thornhill, who retired in 1935 from the position of Divisional Engineer at St. Pancras, L.M.S.R. He came of a notable railway family, being the eldest son of the late Mr. E. B. Thornhill, who was Chief Engineer of the L.N.W.R. from 1902-09; one of his brothers was Mr. H. L. Thornhill, Chief Legal Adviser to the L.M.S.R. from 1927-39, and another brother, Mr. F. B. Thornhill, retired as District Goods Manager, Warrington, L.M.S.R.

The President of the Board of Trade has appointed Mr. G. Dunn, Mr. W. Haigh, Mr. W. Johnstone, Sir William Palmer, and Mr. A. Whitaker to be members of the Council of Industrial Design. He has also re-appointed Sir Leigh Ashton, Mr. Noel Carrington, Mr. G. W. Lacey, Major F. J. Stratton, Sir Charles B. L. Tennyson and Dr. W. J. Worboys to be members of the Council on the termination of their existing appointments. Mr. Andrew Nairn and Mr. R. Lyon Scott have been re-appointed to the Scottish committee of the Council.

Mr. T. G. Creighton, B.Sc.(Eng.), M.I.Mech.E., Director of Mechanical Engineering & Stores, Railway Division, Government of Pakistan, who, as recorded in our February 3 issue, is acting as Director-General of Railways, Government of Pakistan, subsequent to the death of Khan Bahadur M. Nizam-ud-Din, was commissioned during the first world war, and was wounded in action in France early in 1918. After the war he took the degree of B.Sc.(Eng.) of London University, and became a pupil of Sir Henry Fowler, then Chief Mechanical Engineer, Midland Railway. In 1922 Mr. Creighton was appointed by the Secretary of State for India as an Assistant Locomotive Superintendent, Indian State Railways, and joined the North Western Railway. After three years at Quetta, he spent the next four years in the Mechanical Branch of the N.W.R. at Lahore and in the locomotive and carriage and wagon workshops, holding various positions, such as Assistant Works Manager, Chief Draughtsman, Production Engineer and Works Manager. In 1930 he was selected by the Railway Board as Deputy-Director of Mechanical Engineering. Mr. Creighton rejoined the N.W.R. in 1936 as Works Manager, and less than two years later met with a severe railway accident, which incapacitated him for a considerable time. In 1939 he returned to the Railway Board, and shortly afterwards joined the Central Standards Office for Railways, where he was engaged on locomotive, carriage and wagon design, specifications, research and standardisation. He remained there until he was transferred to Calcutta on war duties in 1943. Later he became Deputy Director-General (Railways) in the Department of Supply, and took charge of the purchase organisation which he closed in Calcutta, and transferred to Delhi, in 1946. Early in 1947 he was appointed Controller of Supplies, Railway Board, New Delhi. Mr. Creighton retired from the Government of India soon after August 15, 1947, and was appointed Director of Mechanical Engineering & Stores in the Railway Division, Government of Pakistan, on October 2, 1947.



Mr. T. G. Creighton

Who is acting as Director-General of Railways, Pakistan

The council of the Institute of Welding has awarded the Sir William J. Larke Medal, for the best paper read before the Institute during the year, to Mr. R. G. Braithwaite, who is welding consultant to Braithwaite & Co. (Structural) Ltd., and was last year Chairman of the Birmingham Branch of the Institute. His paper deals with the control of distortion in arc welding.

Mr. John E. Evan Cook, Joint Managing Director of Evan Cook's Packers Limited and other companies in the Evan Cook group, has been elected Chairman of the Institute of Packaging for 1950-51. The office of Chairman is a new one; in effect he succeeds Mr. G. M. Ashwell, who has been President since June, 1948. Mr. E. H. Dickens has been elected Vice-Chairman of the Institute, succeeding Mr. A. H. Tytherleigh, the retiring Vice-President.

Mr. I. A. Marriott, Assoc.I.Mech.E., A.I.Loco.E., Managing Director of W. G. Bagnall Limited, Stafford, has been appointed Managing Director of Parsons Engineering Co. Ltd., Southampton, of which he was already a Director, in place of Mr. Harry Parsons, who will continue as Chairman. Mr. Marriott was born in London in 1911, the son of Mr. H. F. Marriott, sometime a Governor of the Imperial Institute, and Past-President of the

Mr. I. A. Marriott
Appointed Managing Director of Parsons Engineering Co. Ltd.

Mr. W. A. Smyth
Appointed Managing Director of W. G. Bagnall Limited

The late Mr. R. E. Charlewood
Formerly Assistant to Passenger Services Assistant to Chief Operating Manager, L.M.S.R.

Institution of Mining & Metallurgy. He was educated at Rugby and at New College, Oxford, and served from 1933-39 on the engineering staff of Imperial Chemical Industries Limited, Alkali Division; for part of that period he was Personal Assistant to the Production Director. During the late war he saw service with the Royal Engineers, latterly as General Staff Officer (Lt.-Colonel) at Allied Force Headquarters in North Africa, and afterwards at Supreme Headquarters, Allied Expeditionary Force, in Europe, and then on the Control Commission for Germany until demobilisation in 1945. In 1946 Mr. Marriott was appointed General Manager of Cowlishaw & Walker Limited, Stoke-on-Trent. From 1947-48 he served as Commercial Director of the Brush Electrical Engineering Co. Ltd., Loughborough, and of Associated British Oil Engines Limited, London, and in the latter year became Managing Director of W. G. Bagnall Limited. During January and February last he was the Leader of the Diesel Locomotive Manufacturers' Productivity Team on a tour of locomotive plants in the United States. He at present commands 176 Inland Water Transport Workshop Squadron, Royal Engineers (Supplementary Reserve). Mr. Marriott is a Member of the Institute of Industrial Administration and a founder Member of the British Institute of Management.

Mr. W. A. Smyth, M.I.Mech.E., M.I.Loco.E., M.I.P.E., who has been appointed Managing Director of W. G. Bagnall Limited, has hitherto been Director & General Manager of Henry Meadows Limited, Wolverhampton, an associated company. He has also been a Director of W. G. Bagnall Limited since last year. Mr. Smyth was educated at Mountjoy School, Dublin, and the Royal College of Science of Ireland, and served a pupilage with the Midland Great Western Railway, Ireland, on which subsequently he was employed as a junior draughtsman and as Running Shed Foreman. On the amalgamation of the Irish railways he was appointed Assistant District Locomotive Superintendent, Limerick, Great Southern Railways, and later returned to headquarters as Assistant Works Manager in charge of the Progress Office and of locomotive repairs at Inchicore Works. In 1929 Mr. Smyth joined the Ceylon Government Railway as Assistant Mechanical Engineer (Manufacture), a post established in connection with the design and equipment of the new locomotive, carriage and wagon workshops at Ratmalana. He was subsequently promoted Deputy Mechanical Engineer, and finally Mechanical Engineer. During that period he was closely connected with the design of the diesel-electric articulated trains now running on the coast line of the C.G.R. Returning to England in 1937, Mr. Smyth joined Associated Industrial Consultants, and was employed on reorganisation work in many industries and the introduction of production control, time study, incentive schemes and improved manufacturing methods. His services also were lent to an associated company on behalf of which he carried out a six-months survey of the office and workshop methods of the Iraqi State Railways at Baghdad. Mr. Smyth later joined Guest, Keen & Nettlefolds Limited (Screw Department) as Deputy General Works Manager, and later was promoted General Works Manager, a position he resigned in 1947 to take up an appointment as Chief Production Engineer in the Chief Mechanical Engineer's Department of the L.N.E.R. He relinquished that position early last year to become General Manager of Henry Meadows Limited.

Mr. W. V. Golding has been appointed Traffic Superintendent of Dorman, Long & Co. Ltd., in succession to Mr. A. C. W. Impey, who has retired. Before joining the company in 1946, Mr. Golding was Chief Traffic Controller, Darlington District, L.N.E.R.

We regret to record the death on April 9, at the age of 70, of Mr. Rawdon Edward Charlewood, who retired in 1934 from the position of Assistant to the Passenger Services Assistant to the Chief Operating Manager, L.M.S.R. Mr. Charlewood, whose railway career was spent entirely on the passenger-train working side, was a frequent contributor to *The Railway Gazette*, mainly on that subject, and was also a well-known writer in the pages of our associated contemporary, *The Railway Magazine*, to which he had begun contributing in 1902. He joined the Midland Railway as a clerk in the Trains Office at Derby in 1907, and was appointed Assistant to the Superintendent of Passenger Services (Mr. R. Rowland) in 1912. After the formation of the L.M.S.R. he continued in a similar capacity under the Chief General Superintendent, and later the Chief Operating Manager, until his retirement, on account of ill-health, in 1934.

Councillor F. Lloyd has been elected for the ensuing year as President of the Sheffield Chamber of Commerce.

B.T.C. Road Passenger Services

The British Transport Commission has approved the following changes in the boards and management of the Bristol group of bus companies:—

Mr. G. Cardwell, Chairman of the Road Passenger Executive, has relinquished the Chairmanship of Bristol Tramways & Carriage Co. Ltd., Bath Electric Tramways Limited, Bath Tramways Motor Co. Ltd. and the Bristol Joint Transport Committee. He is succeeded as Chairman by Mr. F. J. Chapple, hitherto Director & General Manager of the companies and a member of the committee.

To fill the vacancy caused by the resignation of Mr. Cardwell, and that arising from the resignation of Mr. H. H. Phillips, Mr. F. P. Arnold and Mr. K. W. C. Grand have been appointed Directors of each company and to the Bristol Joint Transport Committee. Mr. J. C. Dean, Director & General Manager of the West Yorkshire Road Car Co. Ltd., has been appointed an additional Director of the Bristol and Bath companies. He has also been appointed a representative on the Bristol Joint Transport Committee in place of Mr. A. J. Romer.

Mr. F. J. Chapple will relinquish his appointment as General Manager of the Bristol Tramways & Carriage Co. Ltd., and the two Bath companies, as from June 1 next; and Mr. J. C. Dean has been appointed General Manager of the passenger transport undertakings of the Bristol company, also General Manager of the Bath companies. Mr. A. J. Romer remains General Manager of the motor construction works of the Bristol company.

The Effect of Electric Traction on the Track

(*Concluded from page* 452)

rapidly battered and wore away the joggle where it projected into the four-foot way, involving frequent renewal of the stock rail to avoid the danger of derailments. The greater inertia of the motor bogie was considered to increase the tendency to this kind of wear.

Rail corrugation was no more common on electric than on steam-occupied track in this country, but a plausible theory was that such corrugation was aggravated on electrified track by a frequent service of trains of uniform composition at the same speeds. Synchronous vibration between wheel and rail might be a pre-disposing cause which could be correctively influenced by adjustments of train speed or sleeper spacing. On exceptionally intense services with frequent braking, the corrugations would be countered by abrasion of the high spots immediately they were formed.

Exfoliation of rails must be included among the effects of electric traction although not peculiar to it. Elongated irregular strips of rail surface up to about $\frac{1}{8}$-in. thick became separated from the underlying metal and eventually fell off. Metallurgical examination of the surface layers revealed that they were severely distorted indicating that the cause of the trouble was excessive wheel pressure.

Wear of Rails

Top wear was dependent on traffic intensity and for this reason was more severe with electric trains, but atmospheric conditions had some influence and the effect of frequent trains was to polish the rail and reduce atmospheric corrosion. In this connection the electric train would reduce top wear, as compared with a less frequent steam service.

The high-flange pressures and low centre of gravity of multiple-unit stock gave rise to severe side cutting on electrified track, so much so that instances were known where rails needed renewing after six weeks use. The rate of wear was greatest on the outside rail on curves, involving early transposition and end for end changing to ensure equal wear both sides.

Periodic side cutting took the form of worn, polished patches spaced alternately at fairly regular intervals along the inner (4 ft.) sides of the two running rails. Side cutting occurred predominantly on straight track and affected both rails equally, and it was far more frequent on electrified than on steam track. The amount of wear was such as to require new rails having a normal life of 20 years to be turned within 2 years, and the riding of vehicles might be so adversely affected as to evoke complaints. Vehicle maintenance was also increased.

The genesis of this periodic side-cutting lay in the characteristic features of bogie oscillation expressed in the formula

$$\lambda = \pi \sqrt{\left(\frac{bd}{t}\right)\left(\frac{b^2 + l^2}{b^2}\right)}$$

where, in consistent units

- λ is the wavelength along the track
- b is the transverse distance between tread-rail contacts
- d is the diameter over wheel treads
- t is the tangent of the angle of wheel coning
- l is the bogie wheelbase of a rigid four-wheel bogie.

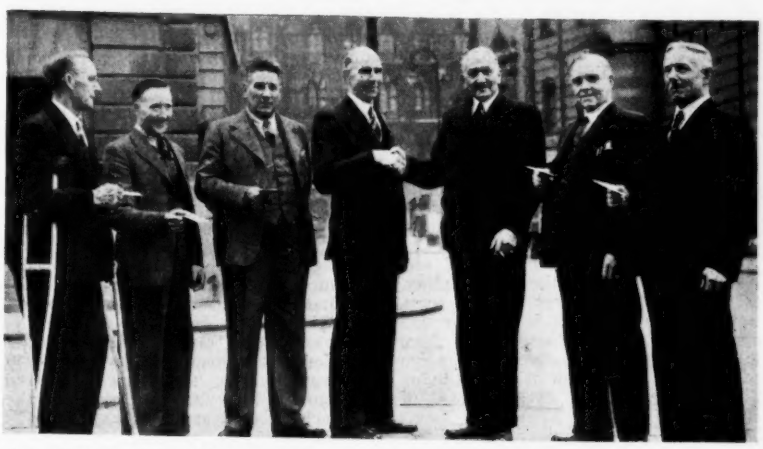
Where periodic side-cutting had been measured in England it had been found that the preponderating wavelength was 55 ft. which was what might be expected of the type of bogies using the track, from the formula given above. This suggested a close connection between periodic side-cutting and the oscillation of coned wheels. Once periodic side-cutting was well established it tended to control the oscillation of appropriately coned wheels, giving a cumulative effect, and the initial oscillation was probably set up by local track irregularities. Features of the rolling stock which accentuated the effect were excessive clearances in axle bearing assemblies and between rubbing surfaces of bolsters and bogie transoms, combined with too little clearance for power axles to move axially relative to motor suspension bearings. The similarity of natural frequency of oscillation of the body with the frequency of side-cutting at normal running speeds of the rolling stock gave rise to more severe oscillations, than normal, with consequent discomfort to passengers. It appeared that the track, the wheels and the bogie all contributed and interacted to cause periodic side-cutting and that all must be maintained in first class condition to ensure that it should not occur.

The costs of electrified track were inevitably heavier than those of equivalent plain track, although lighter rail could sometimes be used where top wear was slight. In some cases high manganese alloy steel switches and crossings were necessary, and these were expensive as were the capital costs of conductor rails, insulators, anchors, bonds and ancillary equipment additional to the plain steam track.

As regards maintenance, the difficulties arising from intensive track occupation, greater deterioration of track components, and obstruction to free working caused by the presence of electrical equipment, tended to increase its cost.

NORTHERN GENERAL TRANSPORT COMPANY.—Arrangements for Norwegian visitors to book coach tours in Britain before departure from Norway were referred to by Mr. W. T. James, Chairman, at the annual general meeting on April 14 of the Northern General Transport Co. Ltd., whose results were given in our March 31 issue. Regarding the Northern Area Road Transport Scheme and nationalisation generally, Mr. James said that, while much publicity has been given to the acquisition of certain omnibus groups by the B.T.C., the number of vehicles acquired was less than one quarter of the total owned by municipal and private operators in the provinces. As to the Greater London Charges Scheme, he would stress that it was not that fares might be increased in London, but that the Minister of Transport had said that the London transport system was a model for the rest of the country; if provincial nationalisation went through, similar charges schemes covering the whole country would lead inevitably to higher bus fares. In the London charges scheme the Consultative Committee had not even the right or the power to appear before the Transport Tribunal; if anyone had a complaint with regard to Northern General services or fares, he could come straight to the management, and then, if he could not obtain satisfaction, to the Licensing Authority.

London Midland Region Track-Lengths Competition



Mr. J. N. Peck, District Engineer, St. Pancras (third from right), congratulating the winners for the London District in the first of the annual competitions inaugurated last year by British Railways, London Midland Region, for the best-kept lengths of track in the Region

Ministry of Transport Accident Report

Near Oakley Station, London Midland Region, British Railways: October 4, 1949

Colonel D. McMullen, Inspecting Officer of Railways, Ministry of Transport, inquired into the accident which occurred at about 2.15 p.m. on October 4, 1949, on the Oakley Viaduct, London Midland Region, when the 1.35 p.m. unfitted freight train, Wellingborough to Brent, consisting of 56 wagons, many containing coal, and a 20-ton van, hauled by a 2-8-0 8F class engine and weighing 1,047 tons, while travelling on the up goods line under clear signals, ran into the rear of the 12.40 p.m. unfitted freight train, also from Wellingborough to Brent, the brake van of which was standing on the viaduct. The speed at the moment of impact was about 30 m.p.h. and the engine and 14 loaded coal wagons plunged over and came to rest on the bank of the River Ouse, 25 ft. below, forming a mass of debris. Wreckage was also piled on the down goods line. The brake van and two wagons of the standing train were wrecked. The driver and fireman of the colliding train were killed instantly.

It was a fine day, with good visibility and dry rails. The diagram on page 463 shows the lines, signals, and so on, which are necessary to an understanding of the occurrence.

Method of Working

The goods lines are worked permissively under the "Regulations for Train Signalling by Telegraph Bells." Between Souldrop and Sharnbrook there are separate bells for the goods and passenger lines but between Sharnbrook and Oakley Stations a common bell in each signal box serves for both sets of lines. Bell signals for the passenger lines, which are worked by 3-position block telegraph, are preceded by "call attention" but those for the goods lines are not. No "is line clear?" signal is used for the goods lines, trains being merely belled on when they enter the section by a "train entering section signal" indicating the type of train, and so on. A signalman can only "refuse" a train by "blocking back" by a telephone message. Telephone communication is on an omnibus circuit and the tone of the telephone bell in no way resembles that of the block bell.

"Train out of section" is sent only when all the trains belled forward have cleared the section, and no signal is sent back behind a train which is being followed in the section by another. Unless this signal has been received a train must be stopped and cautioned before it enters the section, but if it has been then all signals may be cleared for the train in the usual way. The "train out of section" signal is the same for the goods as for the passenger lines—2 pause 1. It is acknowledged by repetition.

"Entering section" and "out of section" are recorded in the train register, but when the latter cannot be given for a train a distinctive mark is made in the appropriate column. These entries form the only indication of the state of the line and a signalman cannot tell how many trains there are in the section ahead of him.

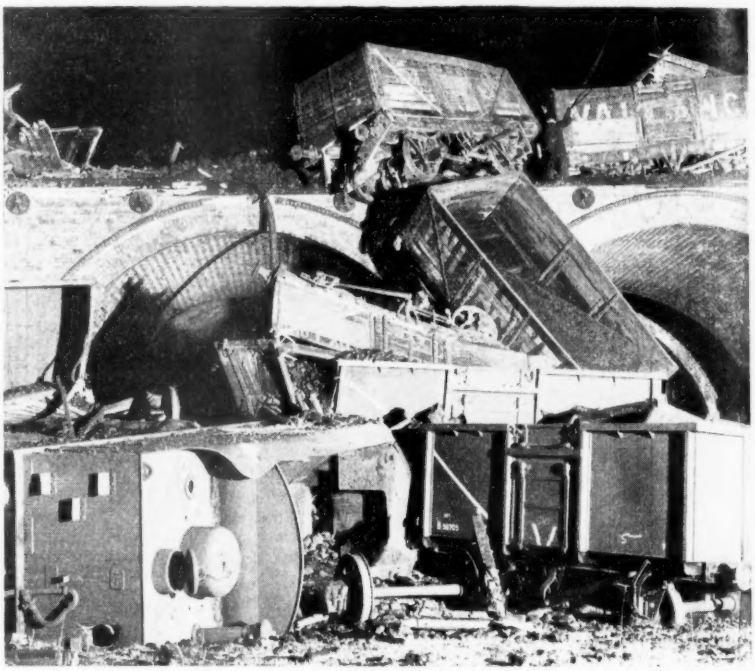
There are about 65 trains in both directions daily on the passenger, and 120 on the goods lines. There is a speed limit of 50 m.p.h. on the goods lines. The up goods outer distant for Oakley Station, shown on the diagram, comes into view when passing through bridge No. 50. There is left-hand curvature and the rear of the standing train could first be seen by the following driver at about 550 yd., telegraph poles and a water tank obscuring the view further back.

Evidence

Movements following some stoppage of traffic led to the train which was run into standing behind another train, held at the home signal for Oakley Station. When this moved forward the driver prepared to move in turn, but heard his vehicles buffering up and knew something serious had occurred. The guard had got down, as was his custom in such circumstances, and saw the colliding train emerge from the bridge. He went towards it, and began waving his flag when he realised it was approaching too fast. He reached the distant signal and the engine passed him there. Its brakes were hard on. The guard of the 1.35 p.m. train said they ran through Sharnbrook at 35 to 40 m.p.h. and near the bridge he received a violent bang. On recovering he applied his brake; no whistle calling for brakes was heard.

The Assistant District Motive Power Superintendent, passing Oakley Viaduct in a down passenger train, saw the guard waving his flag and the crew of the approaching freight engine vigorously applying the brake. He thought the regulator was shut, judging from the smoke that he saw.

At the Sharnbrook signal box, duty was being changed at 2.0 p.m. The signalman due to leave told the relieving man that there were three trains on the up goods line, a fact he had definitely ascertained. He had placed a collar on the up goods starting lever. There were movements due or in progress which he detailed, including a pick-up goods which was to go from the up goods lines across to the sidings and an "A" class goods, accepted on the down passenger line which was to be crossed to the down goods. "Out of section" was received for the up passenger line for a train while the first man was still there, and he acknowledged it and told the other man of it. On some other points evidence was not quite so definite, but the signalman going off duty was certain that no other signal, beyond "out of section" for the train on the up passenger line, was received from Oakley Station while he remained in the box, up to 2 or 3 minutes after 2 p.m.



Some of the wreckage after the collision between two freight trains near Oakley Station, L.M.R., on October 4, 1949

The relieving signalman, who knew about the signal for the up passenger line and had recorded it, confirmed watching the pick-up goods pass to the up passenger line and then to the sidings, and acknowledged, of his own accord, that he committed a block irregularity in allowing that in the face of the Class "A" goods accepted on the down passenger line.

At 2.7 p.m. the 1.35 p.m. train was belled from Souldrop and the signalman thought he had received at 2.3 p.m., as he recorded in his register, "train out of section" for the up goods line. He therefore removed the collar from the starting signal lever and cleared all signals for the train to run through which it did at 2.10 p.m.

This signalman explained that the usual practice adopted by him and others when

wishing to speak on the omnibus telephone to the adjacent box was to give two beats on the block bell. On occasions, misunderstandings occurred regarding signals on the single block bell, especially when signalmen in adjacent boxes gave them simultaneously and they became distorted. In such circumstances he would clear the position by telephone.

He quite believed he received the 2 pause 1 signal, but it might have been the two beats code calling him to the telephone. He picked up the receiver but heard no one speaking. He admitted to Colonel McMullen that he had become confused in some way, as a result of the block irregularity and that he might not have received the signal at all, or might have mistaken one of the other "train out of section" signals for it. It did not occur to him to clarify the position by telephone or that the three trains which he knew to be in section when he came on duty had cleared it very quickly. He could not remember his actions clearly, or account for having recorded two "out of section" signals from Oakley at 2.3 p.m.

He had worked the telegraph bell system for 10 years, but before coming to Sharnbrook had not been in a box where one bell served for both passenger and goods lines. He had six weeks' training and felt confident when he took independent charge, but for the first six months sometimes became confused. He told no one about that. He was 57, and bicycled 11 miles to the box and back daily, which was tiring him. It was very hot on October 4 and the wind was against him. He was somewhat exhausted when he arrived. It was to have been his last day there before being appointed relief signalman.

The two signalmen, in process of changing duty at Oakley Station at 2 p.m., were agreed that no "out of section" signal was given for the goods line and that the signal relating to the up passenger train was correctly preceded by "call attention." Misunderstanding was bound to occur when working two lines of traffic on one bell. One signalman might be using the bell at the same time as the other, and confusion of signals arose. It was not often, but it did happen, and then the telephone had to be used.

Inspecting Officer's Conclusion

The 1.35 p.m. train was allowed to run through Sharnbrook under clear signals when it should have been stopped and warned. The emergency braking applied by the driver accounted for the severe shaking received by the guard, and the evidence tendered to him and other circumstances convinced Colonel McMullen that the deceased man had observed the train ahead at the earliest opportunity and made every endeavour to stop. This was impossible in the short distance of 550 yd. No responsibility rested on the engineman. The two guards acted commendably.

It was evident that the signalman who came on duty at 2 p.m. at Sharnbrook became completely confused when he realised he had committed a serious breach of block regulations on the down passenger line. Colonel McMullen is satisfied that no "out of section" signal was received for the goods line by this man and that he imagined he had heard it. He must have had in mind the signal sent for the up passenger line, received while the other signalman was still with him. Eventually he admitted as much.

The irresponsible action of this signalman was the sole cause of the accident. He was clearly somewhat exhausted when he arrived and it would have been prudent to allow himself more time for his ride on such a hot day. His confusion arising from the block irregularity probably was accentuated by physical exhaustion and led him into much more serious error. In spite of his confidence when assuming charge ten months earlier, clearly he had not accustomed himself to the method of working and found some difficulty with it. Having regard to safety of operation and in fairness to himself he should have confided in the District Inspector and possibly asked to be transferred to a less busy box within easier reach of home. As a signalman for 20 years, he has a good record.

Remarks and Recommendations

It is unlikely that this accident would have occurred in a section equipped with block instruments giving a permanent visual indication of the state of the line.

In a report on a somewhat similar accident in 1936 Colonel A. C. Trench said that the telegraph bell system had worked for many years without undue risk or accident. This was a tribute to the signalmen, but traffic conditions were continually becoming more severe, and the modernisation of that method of signalling should receive serious consideration.

Colonel McMullen considers this modernisation is overdue, as the collision is the sixth in the last five years on these lines and he recommends that it be accepted in principle. A large mileage and considerable expense are involved but the issue should be faced, as the safety of the traffic on adjacent passenger lines is concerned.

As a first step the undesirable use of one bell for passenger and goods lines should be abolished. The possibility of misunderstanding and consequent risk are obvious. Of the 163 signal boxes controlling goods lines worked by telegraph bell and passenger lines also 52 have this arrangement.

As trains are not "offered" but merely belled on, and are allowed to run through or are cautioned depending on whether or not "out of section" has been received, a mistake by one signalman of that nature, as in this instance, automatically produces the conditions for an accident. It would appear that greater security could be obtained by arranging for trains to be offered, as in the event of misunderstanding on the part of the signalman offering, the signalman in advance could correct him. Colonel McMullen recommends that this be given serious consideration. The practice of using the block bell to call a signalman to the telephone is also undesirable, increasing the risk of misunderstanding, and it is satisfactory to record that instructions forbidding it have been issued.

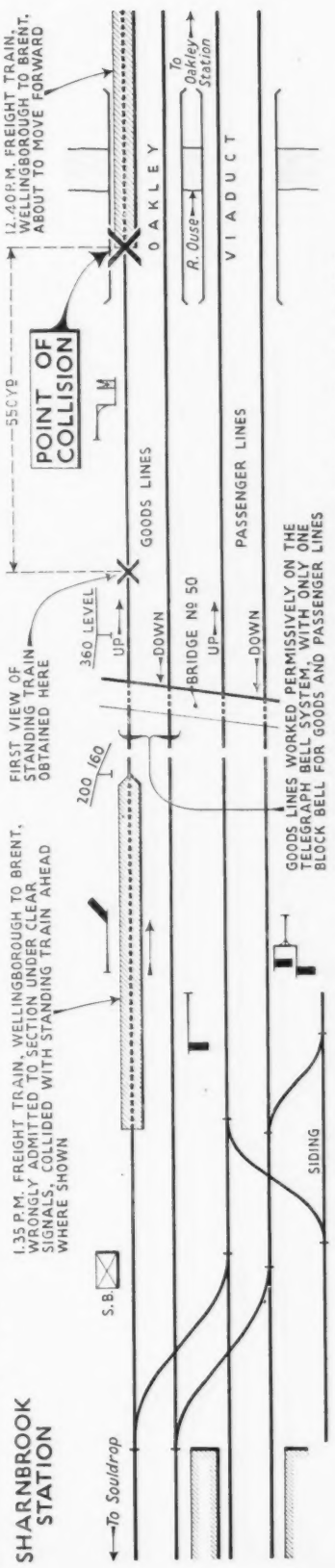

SHARNBROOK STATION
To Souldrop
S.B.
1.35 P.M. FREIGHT TRAIN, WELLINGBOROUGH TO BRENT, WRONGLY ADMITTED TO SECTION UNDER CLEAR SIGNALS, COLLIDED WITH STANDING TRAIN AHEAD WHERE SHOWN
FIRST VIEW OF STANDING TRAIN OBTAINED HERE
12.40 P.M. FREIGHT TRAIN, WELLINGBOROUGH TO BRENT, ABOUT TO MOVE FORWARD
POINT OF COLLISION
55 CYDS
360 LEVEL
200
160
UP
DOWN
GOODS LINES
BRIDGE Nº 50
PASSENGER LINES
OAKLEY
VIADUCT
R. Ouse
To Oakley Station
SIDING
GOODS LINES WORKED PERMISSIVELY ON THE TELEGRAPH BELL SYSTEM, WITH ONLY ONE BLOCK BELL FOR GOODS AND PASSENGER LINES

Diagram illustrating circumstances of the accident near Oakley Station, London Midland Region, October 4, 1949

BRITISH RAILWAYS (LONDON MIDLAND REGION) DRAMATIC SOCIETY.—In its forthcoming production "This Happy Breed," British Railways (London Midland Region) Dramatic Society is including several railwaymen and women who will make their first stage appearance. Among them will be Mrs. Nora Chadwick, wife of the L.M.R. District Estate Agent, St. Pancras, and Mrs. Beckie Pass, wife of an Assistant to the Motive Power Superintendent, Euston. The production will be put on at the Rudolf Steiner Theatre, Baker Street, on April 27, 28, and 29; it will be produced by Mr. Jack Pegg, a Clerk at Euston.

British Transport Commission Statistics (Period No. 2)

Summary of the principal statistics for the four-week period ending February 26

STAFF

—	B.T.C. Head Office	British Railways	London Transport	British Road Services (Road Haulage)	Road Passenger (Provincial & Scottish)	Hotels & Catering	Ships & Marine	Inland Waterways	Docks, Harbours, Wharves	Railway Clearing House	Common Services: Commercial Advertisement	Legal	Total
Number	219	621,323	99,090	69,264	55,231	17,311	5,861	5,161	19,837	649	157	265	894,768
Inc. or dec. ...	+ 1	−1,466	− 134	+ 322	+ 9	+ 33	+ 48	+ 9	− 28	Nil	Nil	+ 2	−1,204

BRITISH TRANSPORT COMMISSION TRAFFIC RECEIPTS

—	Four weeks (Period No. 2) To Feb. 26, 1950	Four weeks (Period No. 2) To Feb. 26, 1949	Aggregate for eight weeks 1950	Aggregate for eight weeks 1949
	£000	£000	£000	£000
British Railways—				
Passengers	6,149	6,534	12,227	12,959
Parcels, etc., by passenger train	2,114	2,118	4,154	4,058
Merchandise	6,348	6,566	12,397	12,792
Minerals	2,326	2,385	4,685	4,724
Coal & coke	5,635	5,504	11,042	10,764
Livestock	75	102	159	194
	22,647	23,209	44,664	45,491
British Railways— Delivery & other road services...	647	653	1,286	1,302
Ships and Vessels	465	486	996	995
London Transport—				
Railways	1,089	1,096	2,208	2,225
Buses & coaches	2,247	2,264	4,488	4,518
Trams & trolleybuses	801	814	1,601	1,624
	4,137	4,174	8,297	8,367
British Road Services— Freight charges, etc.	4,291	1,378	8,570	2,696
Road Passenger Transport	2,174	2,241	4,454	4,495
Docks, Harbours & Wharves ...	853	784	1,675	1,564
Inland Waterways	115	122	232	242
Hotels & Catering	969	916	1,977	1,848

LONDON TRANSPORT

—	Passenger journeys	Inc. or dec. per cent. over 1949	Car miles	Inc. or dec. per cent. over 1949
	000		000	
Railways	49,672	− 0·3	18,018	− 0·5
Buses & coaches	205,268	− 0·8	23,841	− 1·5
Trams & trolleybuses ...	88,310	− 0·8	8,578	− 1·0
Total	343,250	− 0·3	50,437	− 1·1

INLAND WATERWAYS
Tonnage of traffic and ton miles

—	Tonnage	Inc. or dec. per cent. over 1949	Ton miles	Inc. or dec. per cent. over 1949
	000		000	
Coal, coke, patent fuel & peat	478	+ 4·2	7,162	+ 9·8
Liquids in bulk	136	− 9·1	2,964	− 7·3
General merchandise	295	− 7·5	4,559	−20·6
Total	909	− 2·0	14,685	− 5·1

BRITISH RAILWAYS
Rolling Stock Position

—	Operating stock	Number under repair	Available operating stock	Serviceable stock in 1949
Locomotives	19,295	3,517	15,778	15,933
Coaching vehicles	56,600	5,265	51,335	49,576
Freight wagons...	1,106,989	84,377	1,022,612	1,067,462

BRITISH RAILWAYS
Passenger Journeys (Month of January, 1950)

Full fares	Monthly returns	Excursions, cheap day, etc.	Other descriptions	Workmen	Season tickets	Total	Inc. or dec. per cent. over 1949
4,060,000	13,340,000	13,229,000	3,429,000	19,744,000	34,752,000	88,554,000	Nil

BRITISH RAILWAYS
Freight Tonnage Originating and Estimated Ton-Miles (Period No. 2)

—	Minerals	Merchandise	Coal & coke	Livestock	Total	Inc. or dec. per cent. over 1949
	000	000	000	000	000	
Tons originating ...	4,621	4,322	13,575	45	22,563	+ 0·4
Ton-miles	391,458	567,173*	804,024	—	1,762,655	− 2·2

* Includes livestock

BRITISH RAILWAYS (Period No. 2)

—	Total steam coaching train-miles	Total electric coaching train miles	Total freight train-miles	Freight train-miles per train engine-hour	Net ton-miles per total engine-hour	Locomotive coal consumption: Total tons	Locomotive coal consumption: Lb. per engine-mile
	14,128,000	3,714,000	11,093,000	8·11	567	1,112,000	65·9
Inc. or dec. per cent. over 1949	+ 0·3	+ 3·8	− 0·6	+ 3·1	+ 1·2	− 2·3	− 0·9

Staff & Labour Matters

N.U.R. Wage Claim

The N.U.R. claim for higher pay for lower-paid salaried and wages staff was turned down at the meeting of the Railway Staff National Council on April 14. The N.U.R. was represented on the Council by its President, Mr. W. T. Potter, and the General Secretary, Mr. J. B. Figgins, in addition to two other members.

The R.C.A. and the A.S.L.E.F., which had refused to support the claim, were each represented, the constitution of the Council being four representatives of the N.U.R., two of the R.C.A., two of the A.S.L.E.F., and eight of the Railway Executive.

The N.U.R. Executive Committee has met recently to consider the position arising out of the rejection. During negotiations on the earlier N.U.R. claim for 10s. weekly increase, the Railway Executive offered to increase the rate of pay of lower-paid railwaymen receiving 92s. 6d. a week (provinces) by 3s. a week, the advance to be tapered off to extinction at 98s. 6d. in the case of workers receiving a higher rate than 92s. 6d. This was rejected by the N.U.R. at the time as inadequate. It was not repeated by the Railway Executive, in view of the findings of the Board of Conciliation "that neither the claim for a flat rate nor any increase was justified" and also on account of the Government policy as to wage increases.

Mr. Figgins on Wage Restraint

Writing in the *Railway Review* for April 14, Mr. Figgins claims that the lack of purchasing power in U.S.A. last year was the fundamental cause of the recession in trade experienced in that country, and uses this as an argument against the policy of wage freeze and a restraint on personal incomes. "The duty of the British trade union movement," he states, "is not only to accept, but to take the necessary steps to get increases in wages if we have not to have a repetition in this country of the experiences the American workers are having in 1949 and 1950."

Referring to the statement in the Government Economic Survey that there was an increase in 1949 of the gross national product, Mr. Figgins writes: "Is it to be wondered that the stocks of commodities have increased during 1949, and would it be illogical to conclude that these stocks will still further increase if the anticipations of the Survey are realised in 1950, and if there are no wage increases? Surely there is ample room for an increase in the incomes of the working class, and, further, they are entitled to this, since it is by their efforts that the product of industry will increase by no less than £1,000 million, comparing 1948 with 1950? Therefore I welcome the decisions at recent annual trade union conferences which prove that the workers are appreciative of the economic facts and are determined to obtain a real measure of justice by insisting on the termination of the wage freeze policy."

B.T.C. Police Claim

The hearing of the claim for improved pay and conditions for staff in the police forces of the B.T.C., referred to in our March 24 issue, was concluded on April 5. Mr. Honeyman's findings are expected to be promulgated shortly.

British Railways Promotion Scheme

In last week's issue details were published of the new promotion, transfer, and redundancy scheme covering staff embraced in sectional councils 2, 3, 4, and 5, reference being made inadvertently to engine cleaners, firemen, drivers, and motormen being embraced by sectional council no. 1; this should have read as sectional council no. 2.

Questions in Parliament

Property Lost on Railways

Brigadier Terence Clarke (Portsmouth West—C.) on March 22 asked the Parliamentary Secretary to the Admiralty what was the value of Government stores and supplies, the property of his department, which had been lost in transit on the railways each year since the railways were nationalised.

Mr. W. J. Edwards (Civil Lord of the Admiralty): Losses of and damage to Naval material in transit on the railways in the financial year April 1, 1948, to March 31, 1949, were valued at £13,737. Information relating to the current financial year is not immediately available, but I will communicate with Brigadier Clarke.

Brigadier Terence Clarke on March 22 asked the Secretary of State for Air what was the value of Government stores and supplies, the property of his department, lost in transit on the railways each year since the railways were nationalised.

Mr. Aidan Crawley (Parliamentary Under-Secretary of State for Air): A complete record of Air Ministry stores lost in transit on the railways is not maintained centrally, and to obtain the information from all R.A.F. units would require considerable time and effort.

Brigadier Clarke: May I have an assurance that the losses are credited to the Air Estimates, and are not hidden in any way? If that is so, why is it that these losses cannot be stated, as the losses incurred last year must be known if they have been credited to the Air Force and debited to the railways?

Mr. Crawley: Our practice is a little different from that of other Ministries. We allow units to make their own claims. We find that it pays quite well. We get back a considerable proportion of stores and supplies which are credited.

Transport Users' Consultative Committee

Mr. W. L. Wyatt (Birmingham, Aston—Lab.) on April 3 asked the Minister of Transport whether he would take further steps to publicise the Transport Users' Consultative Committees other than the laying of a copy of the annual report before Parliament.

Mr. Alfred Barnes in a written answer stated: I agree that the time has now come to consider the question of giving greater publicity to the part which the consultative committees are intended to play under the Transport Act, and I have this matter under review at the present time.

Mr. Emrys Roberts (Merioneth—Lib.) on April 3 asked the Minister of Transport when he expected to present the first report of the Transport Users' Consultative Committee for Wales.

Mr. Alfred Barnes stated in a written answer: It is only the Central Transport Consultative Committee which is required by the Transport Act to make an annual report to me which is to be laid before Parliament.

AGENT FOR BRUSH ELECTRICAL IN DENMARK.—B. W. Hjorth A/S. Baunegaardsvej 27, Gentofte, Copenhagen, has been appointed exclusive agent in Denmark for the products of the Brush Electrical Engineering Co. Ltd.

The Transportation Club

At the third annual meeting of the Transportation Club, held at 44, Wilton Crescent, S.W.1, on April 12, Mr. T. W. Royle presided in the absence through illness of Mr. Gilbert S. Szlumper, who was recently elected Chairman in succession to the late Mr. J. A. Kay.

The Chairman, dealing with the report and accounts, said that the total income for the year to December 31, 1949, was £7,278, and, after deducting all expenses, including amortisation of lease and debenture interest, there was a deficit of £1,728. Deducting the surplus of £607 brought forward from the previous account left a net deficit of £1,121 to be carried forward. Current assets were £3,297 against liabilities of £2,703. As at December 31 last the total membership was 592.

In paying tribute to the Secretary, Colonel K. R. N. Speir, for his unremitting efforts on behalf of the Club during a difficult year, and in recording appreciation of the work of Mr. Goodchild, the steward, and the staff, the Chairman said he was pleased to say that in the first quarter of the current year there had been some improvement in the financial position. For the three months there had been a profit in place of a loss for the similar period of last year. In the course of a discussion on the adoption of the report and accounts, Mr. W. S. Graff-Baker said that it must rest with the members themselves, and the support they accorded the Club, whether it would be possible to continue in the light of the financial position shown in the accounts.

Mr. James Thom said that, speaking as representative of the senior Dominion, he regretted that more members of the Railway Executive did not make use of the Club as frequently as in the past.

The report and accounts were adopted.

Railway Students' Association

On April 14, the Railway Students' Association held a dinner and dance at the London Transport Executive (South Kensington) Dining Club. Mr. John Benstead, President of the Association and Deputy Chairman of the British Transport Commission, was in the chair.

Mr. John Benstead, proposing the toast "Our Guests," welcomed Mr. D. R. Lamb, Editor of *Modern Transport*, and Mr. B. W. C. Cooke, Editor of *The Railway Gazette*, and said the Association appreciated what they had done in publicising its programmes; both papers were models of what fair-minded technical journals should be. He also welcomed Mr. A. B. B. Valentine, Member, London Transport Executive, and Mr. C. E. R. Sherrington, Director of Research Information Division, British Transport Commission, both Vice-Presidents of the Association.

Mr. D. R. Lamb, in thanking Mr. Benstead for his remarks, said that he was one of the earliest members of the Association which he thought was serving a most valuable purpose.

Mr. D. H. Coombs, Deputy Chairman of the Association, in the absence of Mr. L. W. Orchard, extended his thanks to the President for his term of office which would be remembered by the spontaneous informality with which he moved among members of the Association.

Mr. Benstead in a brief reply said he had enjoyed his term of office and hoped to preserve the same atmosphere in his future relationship with the society.

Notes and News

Technical Sales Representative Required.—A technical sales representative is required for service in the Midlands and North by manufacturers of locomotive and carriage specialities. See Official Notices on page 467.

Tenders Invited for Locomotive Boilers.—Tenders are invited by the Director-General, Indian Stores Department, 32, Edgware Road, W.2, for the supply of superheated, coal-burning, locomotive boilers. See Official Notices on page 467.

Accident at Cleethorpe Road, Grimsby.—On April 11 the engine of the 2.20 p.m. Cleethorpes to Sheffield passenger train, British Railways, Eastern Region, crashed through a level crossing gate in Cleethorpe Road, Grimsby; there were no injuries.

"Monarch" Controllers.—The Monarch Controller Co. Ltd. has issued a warning that the word "Monarch" is a registered trade mark and that it will take legal proceedings in respect of any infringement of its rights in this respect. See Official Notices, page 467.

Assistant Establishment Officer Required.—An assistant establishment officer not over 35 years of age, is required by the Government of Nigeria for the railway department, for one tour of 18 to 24 months, with prospect of permanency. See Official Notices on page 467.

Draft London Area (Interim) Passenger Charges Scheme.—Notice is given that the hearing of this application will commence at 10.30 a.m. on Tuesday, May 9, at the Hoare Memorial Hall, Church House, Great Smith Street, Westminster, London, S.W.1. Copies of the proceedings will be on sale at 10 a.m. the next day, and may be obtained from H.M. Stationery Office, York House, Kingsway, London, W.C.2.

Riverside Station, Liverpool.—Reference was made in our April 7 issue to London Midland Region through engine-workings between Riverside Station, Liverpool, and Euston. We now understand that Class "7" engines are not permitted to work over the Riverside branch and the largest type of ex-L.M.S.R. engine at present authorised for working to and from Riverside Station is the standard Class "5x" 4-6-0 passenger tender taper-boiler type. The standard Class "5" 4-6-0 mixed-traffic tender engine is also authorised.

United Railways of Havana.—In his statement to be submitted to the annual general meeting on April 26 of the United Railways of Havana & Regla Warehouses Limited, the Chairman of the company, Mr. R. G. Mills, reports that neither the company's administration in Havana nor the auditors have had access to the books sufficient for preparation of annual accounts. So far as results can be assessed of operation in Cuba to June 10, 1949, there was a loss on working of £800,000, compared with £189,000 surplus for the previous year. This is due to the uneconomic wage-scale enforced by Cuban law, to the high cost of materials, and to road competition. In addition, the Government of Cuba has not met its obligations to the company. The President of Cuba informed Mr. Mills at audiences last year that his Government was in the same situation as the company, that is, without funds to meet its obligations, and that he was quite unable to entertain the suggestion of nationalisation of the railway.

John Knapkin & Sons Change of Name.—The firm of John Knapkin & Sons, the wagon builders and repairers, has changed its title to the Tyldesley Wagon Co. Ltd., to which future accounts and correspondence must be addressed. The postal address remains 166, Peel Green Road, Barton-upon-Irwell, Eccles, Lancs. (Tel. Eccles 3551), and the works address, Railway Yard, Johnson Street, Tyldesley, Lancs. (Tel. Atherton 769).

English Steel Corporation.—The net profit for 1949 of the English Steel Corporation Limited was £1,023,376, compared with £1,081,595 for the preceding year, with £965,362 (£194,017) brought in, *plus* £154,833 (nil) from sundry receipts. The sum of £28,082 (£26,492) is allotted to the debenture sinking fund. A final deferred dividend is to be paid of 7½ per cent., tax free, making 17½ per cent., tax free, for the year, the same as last year, and £1,831,731 is carried forward.

London Midland Region Women's Ambulance Competition.—Fifteen teams of British Railways, London Midland Region, ambulance women competed for the L.M.R. Women's Ambulance Cup at Holborn Hall, London, on April 18 and 19. The teams came from London (Euston, Broad Street Goods, and Somers Town Goods), Watford, Horwich, Wolverton, Derby, Crewe, Birmingham, Dublin, and Manchester. The Cup and prizes were presented by Mr. John Elliot, Chief Regional Officer, London Midland Region.

19 Railway Group R.E.: Official Visit of C.I.G.S.—Field Marshal Sir William Slim, C.I.G.S., is to inspect 19 Railway Group R.E. (S.R.) on Friday, June 23, during the annual camp. This will be the Field Marshal's first official appearance in his appointment of Honorary Colonel of the R.E. (Tn) Supplementary Reserve. The parade will be at 11 a.m. and there should be some 400 men on parade. The R.A. mounted band will be in attendance. After luncheon Sir William Slim will inspect the men doing their normal programme of training.

Closing of Donaghadee Line, B.C.D.R.—As foreshadowed earlier in the year, a further section of the Belfast & County Down Railway has been closed. On March 30, the Ulster Transport Authority announced that the 22-mile section from Ballymacarrett Junction (Belfast) to Comber, Newtownards, and Donaghadee, would be closed to all traffic on April 24. This leaves only the 12¼ miles from Belfast to Bangor, and the 4½-mile branch from Newcastle to Castlewellan open for traffic. The latter section is worked by the Great Northern Railway (Ireland).

Alterations at Victoria Bus Station.—London Transport has recently completed various alterations at Victoria bus station to assist the 70,000 passengers who use it daily. The steel tower erected in 1927, which was the control centre for a system of colour-light starting signals on the posts at the head of the five loading platforms, has been demolished. The starting system, which had been out of use for some time, has been abandoned and the coloured lamps removed. The stop signs, as well as the lamp-standards on the islands, have been repainted and in some cases re-sited; where possible, separate signs with bold numbers have been provided for each bus route. On the largest of the loading islands an illuminated information stand gives an alphabetical list of the places served by buses from the station; each of its six sides displays a map showing the boarding points. The bus station at London Bridge has been similarly treated and Morden will be dealt with next.

Firth Brown Tools at the B.I.F.—At the Castle Bromwich Section of the B.I.F. from May 8-19, the firm of Firth Brown Tools Limited will be showing a wide range of tools, consisting of drills and reamers, butt welded lathe tools, ground thread taps and chaser dies, metal cutting saws, and so on. Testing the hardness of metals by means of Firth Brown variable load and fixed load machines and the effective metal removal properties of Mollenicut and Dreadnought milled files will also be demonstrated this year.

Steel Tubes at the B.I.F.—The firm of Stewarts and Lloyds Limited and its subsidiary and associated companies will again exhibit a wide range of products at the Castle Bromwich Section of the British Industries Fair which is being held from May 8-19. Exhibits will indicate the increasing use being made of steel tubes in a variety of industrial fields and will illustrate at the same time the large contribution which the products of this firm are making to reconstruction and development. Arrangements have been made to continue the practice of housing many exhibits in buildings erected outside.

Westinghouse Exhibits at Birmingham.—On the Westinghouse Brake & Signal Company stand at the B.I.F., Birmingham, will be a comprehensive display of rectifier, colliery, brake and signal apparatus, prominent among the rectifier demonstrations being a three-phase plating rectifier arranged to show the various methods of control, overload protection, and standby-power supply. The whole demonstration will be operated from the incoming single-phase supply through a bank of Westinghouse static phase converters, which will also be operating a three-phase rectifier supplying 600 volts d.c. to a compressor operating in the brake section. Other exhibits will include sectioned compressors, reservoirs, and control gear for both road vehicle and railway braking. A model track will show the latest developments in mine signalling apparatus, while searchlight and multi-aspect signals of a new design, with corrosion-proof aluminium cases, will demonstrate progress in the signalling field. A point machine, E.P. train stop, highway crossing signal, and route indicators will complete this display.

British Aluminium Company.—The total trading profits of the British Aluminium Co. Ltd. for 1949 were £1,538,359, as compared with £1,845,677 for 1948. This profit was increased to £1,803,595 (£2,088,973) after the addition of investment income and profit on sales of trade investments and exchange. After a deduction of £774,130, against £807,945, including £390,459 for depreciation, £200,000, against £250,000, for plant replacement, and an allowance of £478,262 (£782,578) for tax, the combined net profit was £551,203, as compared with £498,450 last year. A final ordinary dividend is proposed of 6 per cent., making 10 per cent. for the year, the same as last year. An amount of £125,000 is placed to general reserve, £145,000 to income-tax equalisation, and £214,500 to the dividends of the parent company, which last year made a net profit, after tax, of £442,380. The contingencies reserve has been credited with £30,860 in respect of

OFFICIAL NOTICES

WARNING

"MONARCH" CONTROLLERS. It has come to the notice of The "Monarch" Controller Co. Ltd. that Door Controllers not emanating from them have been sold and invoiced as "Monarch" Controllers. The word "Monarch" is the registered trade mark of the "Monarch" Controller Co. Ltd., and for any other Controller to be offered for sale or sold as "Monarch" is an infringement of that Company's rights, and legal proceedings will be taken in respect of any infringement of such rights.

THE Director-General, India Store Department, 32, Edgware Road, London, W.2, invites Tenders for the supply of:—LOCOMOTIVE BOILERS, Superheated, Coal Burning:—(*a*) "H.S.M." class for 2-8-0 goods locomotives; (*b*) "G.S." class for 4-6-0 passenger locomotives; (*c*) "N" class for 4-8-0 + 0-8-4 Garratt locomotives; and (*d*) "NM" class for 4-8-0 + 0-8-4 Garratt locomotives. This advertisement is a repetition of that published in April, 1949, for which the tender forms already purchased are about to issue. Tender forms may still be purchased at the above address at a total cost of £2, or 10s. per set of forms for each class of boiler. The date for the return of tenders has not yet been decided. Reference D.O. 4720/48 should be quoted in all applications.

THE EVOLUTION OF RAILWAYS. Second edition, revised and enlarged. By Charles E. Lee. Traces the germ of railways back to Babylonian times. Cloth, 8½ in. by 5½ in., 72 pp. Illustrated. 6s. By post 6s. 4*d*. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

Crown Agents for the Colonies

ASSISTANT ESTABLISHMENT OFFICER required by the Government of Nigeria for the Railway Department for one tour of 18-24 months, with prospect of permanency. Salary according to qualifications and experience in scale £660 rising to £970 a year, including expatriation pay. Temporary increase of salary between £51 and £72 a year is also payable. Outfit allowance £60. Free passages and liberal leave on full salary. Candidates not over 35 must be educated to matriculation standard and have had experience in dealing with staff work in a large undertaking. Preference will be given to candidates who hold a B.Comm. or B.Sc. (Econ.) degree or who have followed a course of study on personnel management or secretarial practice. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the CROWN AGENTS FOR THE COLONIES, 4, Millbank, London, S.W.1, quoting M/N/24893/3C on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.

RAILWAY SIGNALLING AND COMMUNICATIONS INSTALLATION AND MAINTENANCE. A practical guide, especially intended to help Signal Inspectors, Installers, Fitters, Linesmen, Draughtsmen, and all concerned with installing and maintaining Signal, Telegraph, and Telephone Equipment. 416 pp. Many illustrations. Cloth, 8s. By post 8s. 6*d*. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

GLOUCESTER RAILWAY CARRIAGE & WAGON CO. LTD., Gloucester, require the services of experienced rolling-stock Draughtsmen. Five-day week. Staff pension scheme. Apply, stating age, details of experience, and salary required, to Chief Designer.

SENIOR MECHANICAL DRAUGHTSMEN required immediately for large engineering establishment in Glasgow, preferably with steam, diesel, or electric locomotive experience. Applications from men with first class qualifications and sound general mechanical training will receive every consideration. Good salaries and working conditions, also contributory superannuation scheme.—Address 0641, WM. PORTEOUS & Co., Glasgow.

TECHNICAL SALES REPRESENTATIVE required for service in Midlands and North by manufacturers of Locomotive & Carriage Specialities. Salary according to qualifications, which could with advantage include experience of Locomotive and Carriage design and/or construction. Apply in writing stating age and giving details of previous experience to: Box 534, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

STANDARD MILITARY RAILWAY BRIDGES. By F. S. Bond. A description of the different types of bridges designed for rapid erection in the field by the Allied Forces, and of the various methods employed in such erection. 28 pages. 9 in. by 12 in. fully illustrated. Paper cover, 5s. By post 5s. 2*d*. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

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losses in previous years of certain subsidiaries now made good.

Holiday Rail Travel at Discount Rates.—In conjunction with the Savings Bank of Glasgow, British Railways has introduced a scheme whereby passengers get their rail tickets for holiday travel at the local branch of the Savings Bank at 1s. in the £ discount. This extra saving can be made by all depositors in the Cambuslang, Carluke, Clydebank Darvel, Dumbarton, Dunoon, Girvan, Helensburgh, Irving, Kilmarnock, Lanark, Lennoxtown, Motherwell, Newmilns, Oban, Prestwick and Wishaw branches of the Savings Bank of Glasgow.

Later Departure of Continental Boat Trains.—With the introduction of Summer Time on Sunday, April 16, the "Golden Arrow," "Night Ferry," Folkestone-Calais, and Dover-Ostend services to the Continent leave London (Victoria) one hour later than before. The Newhaven-Dieppe service leaves 30 min. later. The new timings are:—

	Dep. Victoria	Arr. Paris
Dover—Calais ...	10. 0 a.m.	6. 0 p.m.
	10.30 a.m.	5.30 p.m.
	"Golden Arrow"	
Dover—Dunkerque	10. 0 p.m.	9.30 a.m.
	"Night Ferry"	
Dover—Ostend	11. 0 a.m.	—
Newhaven—Dieppe	9.35 a.m.	6.40 p.m.
Folkestone—Calais	2. 0 p.m.	9.50 p.m.

The inward services arrive at the English Ports and in London one hour later than formerly, except the "Night Ferry," which remains unaltered.

New District Line Train in Service.—On April 17 the first of a series of new District Line trains was put into operation by London Transport. The new vehicles, which were described and illustrated in our December 23, 1949, issue, have wider windows with new-type ventilators, a more even distribution of seats, and elbow recesses on the cross seats; fluorescent lighting is used throughout. Other features include new-type heating, a smart interior finish in cerulean blue with silver-bronze for the ceiling fittings and continuous route diagrams similar to those in the latest tube cars. Externally the train resembles the latest pre-war stock, except that its design includes door-fault detector lights to indicate when an air-worked door fails to close completely, a fluorescently-lit destination blind and twin electric tail-lamps. The new train, made up of eight cars, is known as "R" stock and is the first of many now being delivered; in all, 143 non-driving motor cars are being constructed and 82 existing trailer cars converted to "R" type driving motor cars.

Display of B.I.C.C. Products.—The firm of British Insulated Callender's Cables Limited will show a wide range of electrical products at the Birmingham section of the British Industries Fair. A prominent feature will be a display of cables and wires, including oil-filled, impregnated pressure, and solid type high-voltage cables. Of particular interest in this range will be the three-core 33 kV. aluminium sheathed impregnated pressure cable. The display of smaller cables will comprise ranges specially designed to meet the requirements of industrial and aircraft wiring, railway signalling, mining, telecommunication, and public address installations. A representative selection of electric resistance welders will be shown, and will include both bench and floor type spot, butt, and projection welders, and also fine wire and fine wire brazing machines.

British Railways Staff Exchange with French and Dutch Railways.—An exchange visit between small groups of specially-selected younger railwaymen of the British and French and Netherlands railways has been arranged by the Railway Executive to take place in the early summer. Each group will consist of four officials representing the operating, commercial, civil engineering, and mechanical and electrical engineering departments. The Anglo-Dutch exchange will be for four weeks and the Anglo-French for six weeks, and during these periods the officials will study, usually in the provinces, the railway subjects in which they specialise in their own country. A similar exchange took place between the British and French Railways last year. The Dutch officials were due in England on April 17 and the French are due on May 31, both British parties will begin their tour on May 31. A further exchange of staff is now in progress between the Hotels Executive and the Compagnie Internationale des Wagons-Lits et des Grands Express Européens for the study of restaurant car and other activities on the Continent and in Great Britain.

New Edinburgh Station Opened.—A new station on the Scottish Region Leith Central branch, Edinburgh, adjoining the Easter Road ground of Hibernian football club, was officially opened on April 8. The first passenger train at the new Easter Road Park Station arrived from Glasgow with the Clyde football club team and officials on April 8 and on arrival were welcomed by Mr. T. F. Cameron, Chief Regional Officer, Scottish Region, and Mr. H. S. Swan, Chairman of the Hibernian club. The station has a 600-ft. long platform and the exits give direct access to the football ground; it will be used for detraining only.

Institution of Locomotive Engineers.—An informal meeting of the Institution of Locomotive Engineers will be held at St. Ermin's Hotel, Caxton Street, Westminster, London, S.W.1, at 5.30 p.m., on May 4. The following films will be shown during the meeting: "The Locomotive," by courtesy of the Locomotive Manufacturers' Association of Great Britain; "Chicago Railway Fair," shots of the spectacle "Wheels a'Rolling," by courtesy of Mr. H. Wilmot, Chairman, Beyer, Peacock & Co. Ltd.; "The Royal Train in South Africa," by courtesy of Metropolitan-Cammell Carriage & Wagon Co. Ltd.; and "The Coal Burning Locomotive on the Norfolk & Western Railway, U.S.A.," by courtesy of Beyer, Peacock & Co. Ltd.

Japanese Rolling Stock Exports.—The resurgence of Japanese industry was the subject of a recent address by Air Vice-Marshal C. A. Bouchier at a conference held under the auspices of the Federation of British Industries. In spite, he said, of the fall behind the Iron Curtain of some of their sources of cheap raw materials, the Japanese were striving to increase their exports *inter alia* of railway material. According to official statistics, whereas, in 1941, the average monthly production of standard railway material was 63 steam and three electric locomotives, 110 passenger and 904 goods vehicles, the corresponding figures for August, 1949, three years after recommencement of production, are 19, one, 106, and 203. The output of

industrial (tramway, and so on) rolling stock in July, 1949, included 748 wagons, compared with a monthly average of 1,735 in 1941. While most railway material was for the rehabilitated Japanese Government Railways, exports in the second half of 1949 included 40 steam locomotives, 37 passenger and 490 goods vehicles to Siam, and smaller quantities of electric and other locomotives and rolling stock to U.S.S.R., Korea, and the Philippines.

Sanderson Products.—The trend towards more and better colour in domestic, office, and industrial *décor* is shown in current products of Arthur Sanderson & Sons Ltd., of Berners Street, London, W.1, who have carried out decorative schemes in former railway hotels. Wallpapers and other surface finishes in gay or more modulated colours and patterns are combined with rich or plain hangings to match furniture of different styles. Of industrial interest are diagrammatic plywood panels giving stereoscopic views of planned premises, combining the advantages of a model and an artist's impression. In applied chromatics, the schemes provide for the proper conditions of light reflection and absorption in industrial plants; colour contrasts between the different parts of machines; the right tones and textures for floor, wall, and ceiling surfaces; and conformity with a safety code of colour signals and with standard practice in the coloured finish of service pipes and conduits.

Forthcoming Meetings

April 21 (*Fri.*).—Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1, at 5.30 p.m. Discussion: "Effect of Tapered Treads on the Motion of Overhead Travelling Cranes," by Messrs. E. L. Diamond and A. M. Frankau.

April 25 (*Tue.*).—Institute of Transport, Metropolitan Graduate & Student Society, at 80, Portland Place, W.1, at 5.30 for 6 p.m. Election of officers and committee, followed by "The International Railway Union," by Mr. H. P. Betlem.

April 25 (*Tue.*) to 27 (*Thu.*).—Public Transport Association Incorporated; 1950 Conference at Brighton.

April 25 (*Tue.*) to 28 (*Fri.*).—Institute of Welding; Conference of Branch Officers and Spring Meeting at Birmingham.

April 26 (*Wed.*).—Permanent Way Institution, London Section, at Denison House, 296, Vauxhall Bridge Road, S.W.1, at 6.30 p.m. "De-Icing of Conductor Rails," by Messrs. H. Chanter and W. J. Webb.

April 27 (*Thu.*).—Institute of Fuel, at the Connaught Rooms, Great Queen Street, London, W.C.2. Annual general meeting at 11 a.m.; annual luncheon at 1 p.m.

April 27 (*Thu.*).—Road Haulage Association, at Beaver Hall, Great Trinity Lane, London, E.C.4. Annual general meeting at 10.30 a.m.

April 29 (*Sat.*) to May 14 (*Sun.*).—Liege International Fair; Mining, Metallurgy, Mechanical and Electrical Engineering.

April 29 (*Sat.*).—British Railways, Southern Region, Lecture & Debating Society. Visit to Southampton Docks and the *Queen Mary*.

May 3 (*Wed.*).—Institute of Traffic Administration, London Centre, at Caxton Hall, Westminster, at 7 p.m. Annual general meeting.

Railway Stock Market

Now the budget proposals are known it should be less difficult to assess the investment outlook. It is thought in the City that important new issues may make their appearance, and that in the gilt-edged market the way may be prepared for the issue by British Electricity, which is expected to amount to more than £100,000,000. It is, moreover, known that many big industrial issues have been held up awaiting the budget.

Foreign rails have been less active. Leopoldina stocks fluctuated somewhat sharply, though it is thought that the scheme of arrangement will go through; on this basis, all stocks are undervalued at current market prices. At the time of going to press, Leopoldina ordinary stock is changing hands around 9¼, the preference around 25, the 4 per cent. debentures are 89½ and the 6½ per cent. debentures 127. Leopoldina Terminal ordinary units are 1s. 7½d. and the 5 per cent. debentures 88.

Elsewhere, San Paulo 10s. ordinary units have strengthened to 14s. 9d. and there has been a fair amount of activity in Great Western of Brazil, which have firmed up to 140s. 6d. at the time of writing; buyers were attracted by the fact the directors estimate of the pay-out to be at least 155s., so that the current market price is an undervaluation. The decision of Brazil to redeem some of her sterling bonds at par has helped sentiment, for the view is gaining ground that there is no question of Brazil being short of sterling, and no reason why the Great Western of Brazil and Leopoldina take-overs should not be ratified finally during the next few months. In that case stockholders could receive their pay-out money by the autumn. When Brazil finally ratifies, the stocks of both companies will probably improve closer to their estimated pay-out levels.

Partly owing to the improvement in dollar stocks, Canadian Pacifics have been active, and although best levels were not held, were higher on balance at 29¾. Buying has been partly caused by revived demand for shares of all Canadian companies owning land on which oil may be found.

Manila "A" debentures were 87 and the preference shares 8s. 9d., but there has been further selling of United of Havana stocks in the continued absence of news of the take-over negotiations. The 1906 debentures have declined sharply to 23. There was more activity in Taltal shares, which changed hands up to 19s. 6d., sentiment being helped partly by the view that improvement in traffics will continue.

White Pass Yukon 6 per cent. income debentures were dealt in actively around 71. Calgary & Edmonton 4 per cent. debentures were 93½. Antofagasta ordinary and preference were 8 and 43 respectively.

Road transport and allied companies' shares have been steady and remained generally firmly held because of their good investment merits. West Riding Automobile fell sharply to 61s. 3d. on the decision to discontinue the take-over negotiations which have been in progress for over a year with British Transport. Later the price rallied to 63s. 9d. The City feels that the British Transport Commission is probably now unwilling to give as reasonable take-over terms as a year ago, and that the whole question of further nationalisation is difficult to assess. Nevertheless, from the shareholders' point of view, it is felt that in the event of any fresh acquisitions, they can confidently expect to receive more than the current price of their shares, and that in the meantime prospects seem good of dividends being maintained. Recognition of these points may explain why road transport shares continue to be firmly held. Southdown have remained at 125s. at the time of going to press, Lancashire Transport at 83s., and West Riding at 63s.

The excellent impression created by financial results, and recognition that the companies are well supplied with orders, have drawn further attention to locomotive builders' and engineers' shares. Yields in most cases are still quite attractive despite the further improvement now recorded in prices of the shares.

Beyer Peacock have advanced to 21s. 4½d., Vulcan Foundry to 20s. 3d., North British Locomotive were firmer at 17s. 9d. and Wagon Repairs 16s. 3d. Elsewhere, Hurst Nelson were 58s. 9d., Gloucester Wagon 47s. and Birmingham Wagon 28s. 9d. Charles Roberts were 81s. 3d. and Central Wagons 84s. 6d.

Iron and steel shares have been firmer generally with Guest Keen higher at 41s. 4½d. in anticipation of the financial results due shortly. Vickers kept at 27s. 9d. in front of the dividend announcement.

Traffic Table of Overseas and Foreign Railways

	Railway	Miles open	Week ended	Traffics for week: Total this year	Traffics for week: Inc. or dec. compared with 1947/48	No. of week	Aggregate traffics to date: Total 1948/49	Aggregate traffics to date: Increase or decrease
				£	£		£	£
South & Central America	Antofagasta ...	811	9.4.50	43,080	— 36,370	14	813,824	— 150,760
	Costa Rica	281	Feb., 1950	c685,032	— c248,448	35	c6,604,802	— c1,416,433
	Dorada	70	Feb., 1950	39,908	+ 11,844	8	78,005	+ 18,292
	Inter. Ctl. Amer. ...	794	Feb., 1950	$1,181,630	+ $182,446	8	$2,468,266	+ $379,280
	La Guaira	22¾	Mar., 1950	$105,900	— $7,858	13	$263,249	— $66,504
	Nitrate	382	31.3.50	22,876	+ 1,141	13	120,694	+ 15,427
	Paraguay Cent. ...	274	7.4.50	₲168,100	+ ₲45,587	40	₲5,770,875	+ ₲1,603,017
	Peru Corp. ...	1,050	Feb., 1950	$5,954,700	+ $1,290,676	35	$46,205,358	+ $14,445,660
	" (Bolivian Section)	66	Feb., 1950	Bs.9,346,000	+ Bs.1,867,691	35	Bs.81,738,164	+ Bs.13,679,397
	Salvador	100	Dec., 1949	c278,000	+ c11,000	26	c730,000	— c46,000
	Taltal	154	Mar., 1950	17,595	+ 6,185	39	120,640	+ 40,300
Canada	Canadian National†	23,473	Feb., 1950	12,255,000	— 45,000	8	23,935,000	— 801,000
	Canadian Pacific† ...	17,037	Feb., 1950	8,801,000	— 166,000	8	16,982,000	— 1,240,000
Various	Barsi Light* ...	167	Feb., 1950	25,470	— 3,272	48	324,240	+ 21,755
	Egyptian Delta ...	607	28.2.50	15,096	+ 191	48	626,544	— 42,887
	Gold Coast... ...	536	Feb., 1950	234,159	— 6,199	48	2,547,700	+ 163,306
	Mid. of W. Australia	277	Feb., 1950	30,534	+ 3,578	35	242,095	+ 12,087
	Nigeria	1,900	Jan., 1950	502,360	+ 38,978	44	5,017,814	+ 266,573
	South Africa ...	13,347	25.3.50	1,410,483	+ 27,331	51	75,349,318	+ 5,326,242
	Victoria	4,744	Dec., 1949	1,866,026	+ 372,920	26	—	—

* Receipts are calculated @ 1s. 6d. to the rupee

† Calculated at $3 to £1